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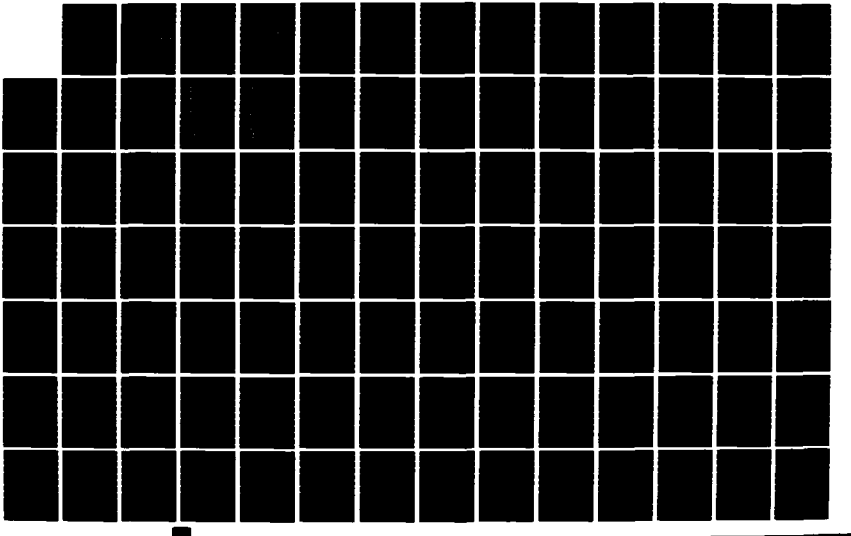

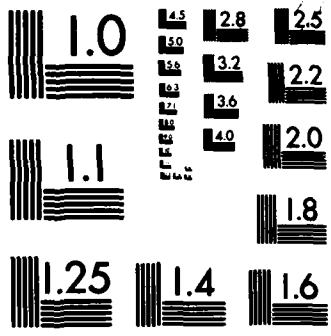

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DNA 6133F

LOAD PLAN AUTOMATION IN A DAMMS ENVIRONMENT (LADEN) IN SUPPORT OF DEPARTMENT OF THE ARMY MOVEMENTS MANAGEMENT SYSTEM

Movements Planning Module (DAMMS-MPM)

JAYCOR
P.O. Box 85154
San Diego, California 92138

12 February 1982

Final Report for Period 15 June 1981—12 February 1982

CONTRACT No. DNA 001-80-C-0365

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Movement Planning	Civilian Wheeled
Rail	Loading Program
Barge	LADEN
Air	

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

The Movement Planning Module, LADEN, has been developed to provide an automated capability to specifically load and to determine the movement asset requirements in support of the movement of personnel, materiel (both bulk and individual items) and units. This module produces as output movement asset requirements by movement data, mode, origin and destination combinations and detailed listings of what is loaded on each convoy, plane or train. In addition, this loading program can be used to generate the initial load preferences for the TRANATAK

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20. Abstract (Continued) transportation movements model.

TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

LIST OF ILLUSTRATIONS

LIST OF TABLES

SECTION 1
GENERAL DESCRIPTION

The Department of the Army Movements Management System Movements Planning Module (DAMMS-MPM) has been developed to provide the transportation planner with an analytical tool which can be used to generate information on movement requirements. The objectives of DAMMS-MPM are generally threefold: 1) reduce the volume of manual transportation data manipulation and reports generation through automation; 2) to provide the capability of developing detailed transportation feasibility of wartime, contingency and peacetime exercise programs under varying conditions, and 3) test the sensitivity of .arying impacts on the transportation system (e.g., battle losses to transportation assets, changing tactical situations).

The Load Plan Automation in a DAMMS Environment (LADEN) program has been designed to identify and react to three types of movement: unit, overweight/outsized and all other. The unit move assumes that a particular military organization needs to move as an integral set of people, equipment and other materiel. This type of movement normally will not support optimization of loading and suboptimization must be accepted in the name of operational expediency. Overweight/outsized equipment requires unique loading because of its specific dimensional and weight restrictions; therefore it is treated separately. Finally, the all-other category includes bulk supply items and nonunit personnel which can be processed in a less restrictive manner.

LADEN accepts as input the movement requirements. It determines, based upon analyst generated priorities, preferred mode, and the available types of cargo carriers. It further determines the required mix of cargo carriers organized into air, barge, rail, military wheeled and civilian wheeled movements. The numbers of vehicles that constitute a convoy or the length and weight of a train are analyst controlled as are the cube and weight limitations associated with a particular cargo carrier.

There is basically no restriction on the number of items or the number of classes of supply that can be handled by LADEN. Additionally, there is no

restriction on the number of movement days or combinations of origin and destination pairs that can be processed.

LADEN has been designed and developed for stand alone operation although in some cases it requires access to sizeable standard equipment description lists and TOE organizational equipment lists. The program has been structured to support two separate and distinct applications - to support the USAREUR Wartime Movements Program, as well as other planning functions, and to provide initial load preference listings in support of the TRANATAK simulation model. Separate reports are generated for each application.

Section 2 outlines input data requirements. Section 3 describes the output data and explains the data and its' formats. Section 4 contains the design description of the model. Section 5 contains information for the programmers who provide support to the program.

A schematic of LADEN is shown in Figure 1-1.

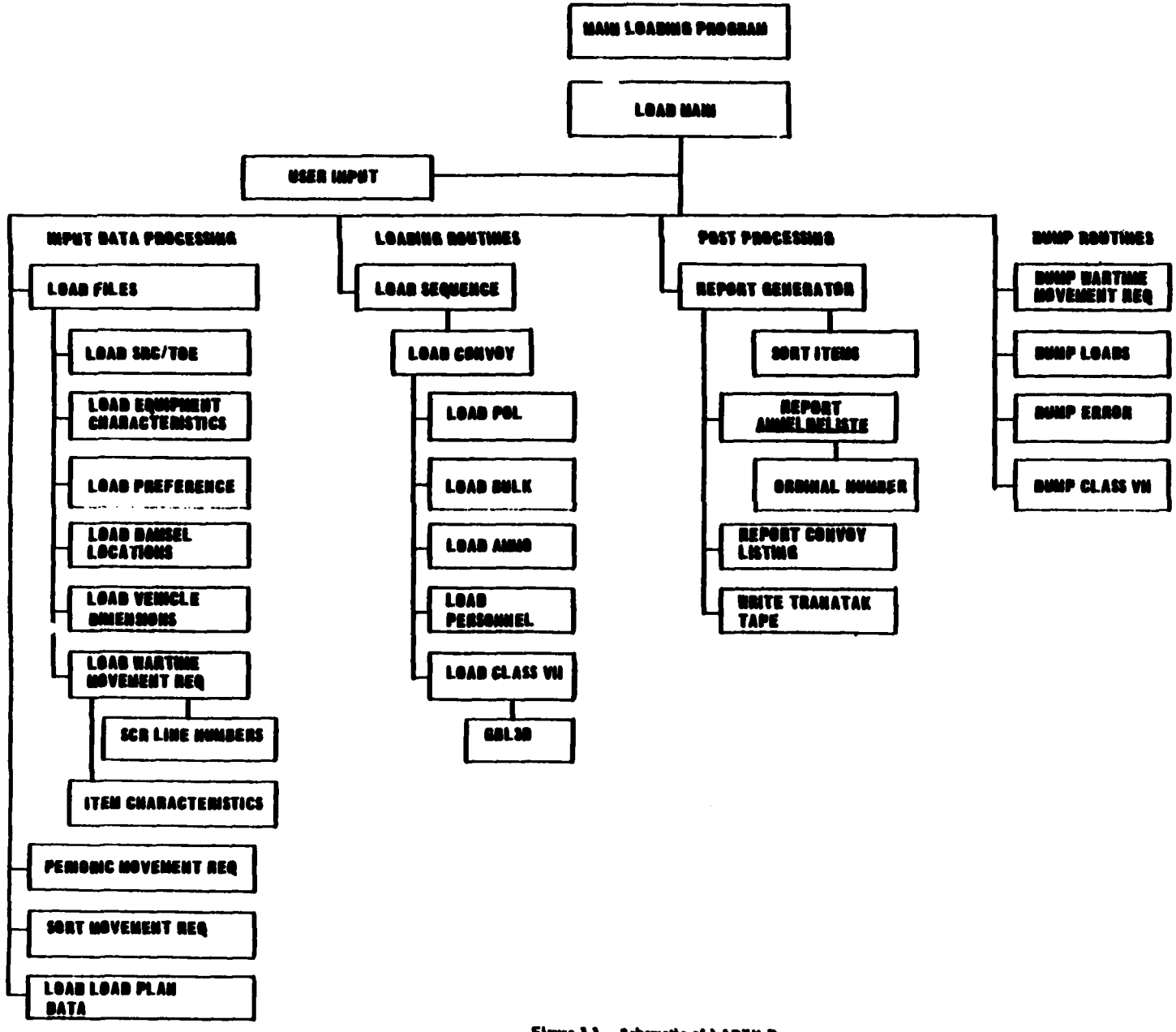


Figure 1-1. Schematic of LADEN Program.

SECTION 2
INPUT DATA

2-1 GENERAL.

All models require input data which describe the objects that are to be represented in the model and how they are to be represented. The objects that are represented in LADEN are the transportation modes, the specific cargo carriers and their capacities and dimensions and of course the materials and people to be moved. Additional information is required identifying the required movement date, the origin and destination of each movement and what constitutes a complete convoy or train.

Items requiring movement are either individually identified with their dimensions and weight or are listed by supply class. In all cases a preferred transportation mode (air, barge, rail, military wheeled, civilian wheeled) must be specified. Adherence to program quantity and dimension specifications is required for proper results.

2-2 PREPARATION OF INPUT DATA.

The preparation of input data for the loading program is a demanding but not a complex effort. It involves validating existing data, collecting or generating and integrating new data, and checking the accuracy of all data elements prior to executing the model.

2-2.1 Review of Existing Data File.

Prior to inputing data into the computer for a specific application, it is recommended that the existing input data files be reviewed to determine their applicability to the current application. This review, even if it identifies areas that require major modification or change, can significantly reduce the time required to prepare a new application. During this review process the values of accepted data should be independently verified as still being valid or appropriate to the specific application under development. Often data values which were

formerly acceptable have changed or a range of values exist and for the previous application one value was appropriate whereas another value might be preferred for the new application.

2-2.2 Preparation of Worksheets.

If new files or new data are required, it is recommended that the analyst prepare appropriate work sheets to document the development of his data. In LADEN there are several interrelated files which may prove to be more difficult to develop independently than if they are created in an integrated manner. Once the data have been developed, the work sheets become the basis for the preparation of input cards or inputting the data through an interactive terminal. Preparation of these work sheets are described in connection with development of each type of input data, where applicable.

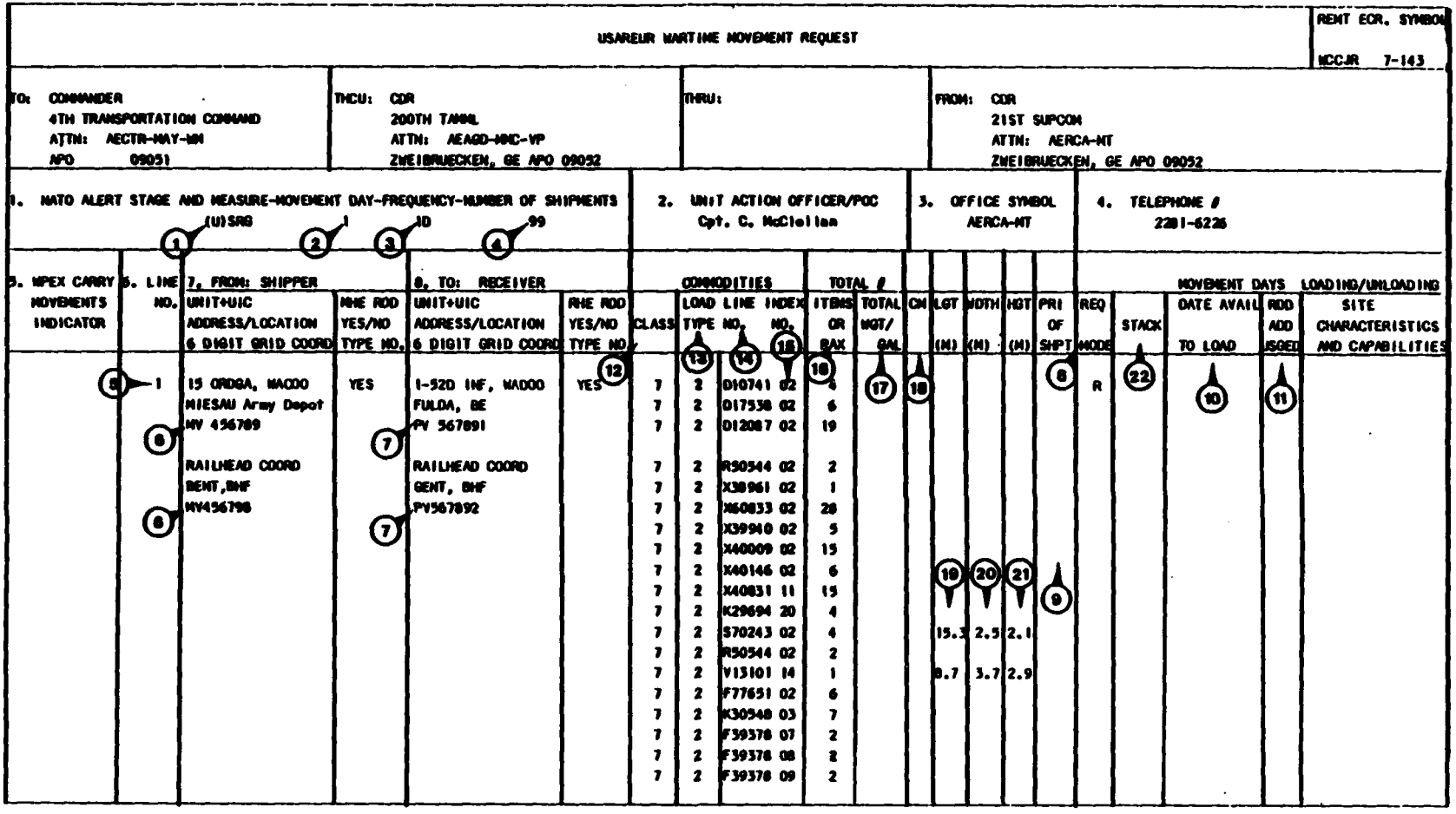
2-2.3 Coding Input Data.

All input data should be coded according to specific instructions in an IBM FORTRAN Coding Form or a comparable form. The completed forms are then converted to input cards or are used to load the data directly into the computer.

2-3 INSTRUCTIONS FOR PREPARATION OF WORK SHEETS.

2-3.1 Movement Requirements.

The bulk of the input preparation effort involved in any new application will be the development of the movement requirements. Figure 2-1 is a sample of a form used by USAREUR in preparation of its Wartime Movements Program. The types of data contained on this form are of two categories: those which are needed to support LADEN and those which are required solely for administrative purposes. The arrows superimposed on this figure indicate data required for the loading program. The associated numbers correlate to the input data card description described in paragraphs 2-3.1.1 and 2-3.1.2 and the sample data shown in Figures 2-2 and 2-3. Although Figures 2-2 and Figure 2-3 contain most of the data entered on the original worksheet (Figure 2-1), many of the items are informational only and merely are recorded for purposes of preparing the appropriate output; they do not influence the operation of the model. To input data for a specific movement requirement one REQ1 card or data elements and as many REQ2 cards or data combinations are required as there are separate entries under the commodity heading (see column 9 of Figure 2-1). Explanatory descriptions of the contents of the REQ1 and REQ2 cards are contained in the following subparagraphs.



USAREUR WARTIME MOVEMENT REQUEST

REMT ECR. SYMBOL: MCCJR 7-143

TO: COMMANDER
4TH TRANSPORTATION COMMAND
ATTN: AECTR-MAY-MM
APO 09051

THCU: CDR
200TH TAMBL
ATTN: AEAGD-MMC-VP
ZWEIBRUECKEN, GE APO 09052

THRU:

FROM: CDR
21ST SUPCOM
ATTN: AERCA-MT
ZWEIBRUECKEN, GE APO 09052

1. NATO ALERT STAGE AND MEASURE-MOVEMENT DAY-FREQUENCY-NUMBER OF SHIPMENTS: (1) (U)SRG (2) 1 (3) ID (4) 99

2. UNIT ACTION OFFICER/POC: Cpt. C. McClellan

3. OFFICE SYMBOL: AERCA-MT

4. TELEPHONE #: 2281-6226

5. MPEX CARRY MOVEMENTS INDICATOR	6. LINE NO.	7. FROM: SHIPPER UNIT+UIC ADDRESS/LOCATION 6 DIGIT GRID COORD	RHE ROD YES/NO TYPE NO.	8. TO: RECEIVER UNIT+UIC ADDRESS/LOCATION 6 DIGIT GRID COORD	RHE ROD YES/NO TYPE NO.	COMMODITIES CLASS	LOAD TYPE	LINE NO.	INDEX NO.	TOTAL # ITEMS OR PAX	TOTAL WGT/ CAL	CM	LGT (M)	WDTH (M)	HGT (M)	PRI OF SHPT	MOVEMENT DAYS REQ MODE	STACK	DATE AVAIL TO LOAD	RDD ADD USGED	LOADING/UNLOADING SITE CHARACTERISTICS AND CAPABILITIES
	1	15 ORDGA, WADDO	YES	1-52D INF, WADDO	YES	7	2	D10741	02	6							R				
		NIESAU Army Depot		FULDA, BE		7	2	D17538	02	6											
		MV 456789		PV 567891		7	2	D12087	02	19											
		RAILHEAD COORD		RAILHEAD COORD		7	2	R50544	02	2											
		GENT,BNF		GENT, BNF		7	2	X38961	02	1											
		MV456798		PV567892		7	2	X60833	02	28											
						7	2	X39940	02	5											
						7	2	X40009	02	15											
						7	2	X40146	02	6											
						7	2	X40831	11	15											
						7	2	K29694	20	4											
						7	2	S70243	02	4			15.3	2.5	2.1						
						7	2	R50544	02	2											
						7	2	V13101	14	1			8.7	3.7	2.9						
						7	2	F77651	02	6											
						7	2	K30948	03	7											
						7	2	F39378	07	2											
						7	2	F39378	08	2											
						7	2	F39378	09	2											

Figure 2-1. Movement Requirements Request.

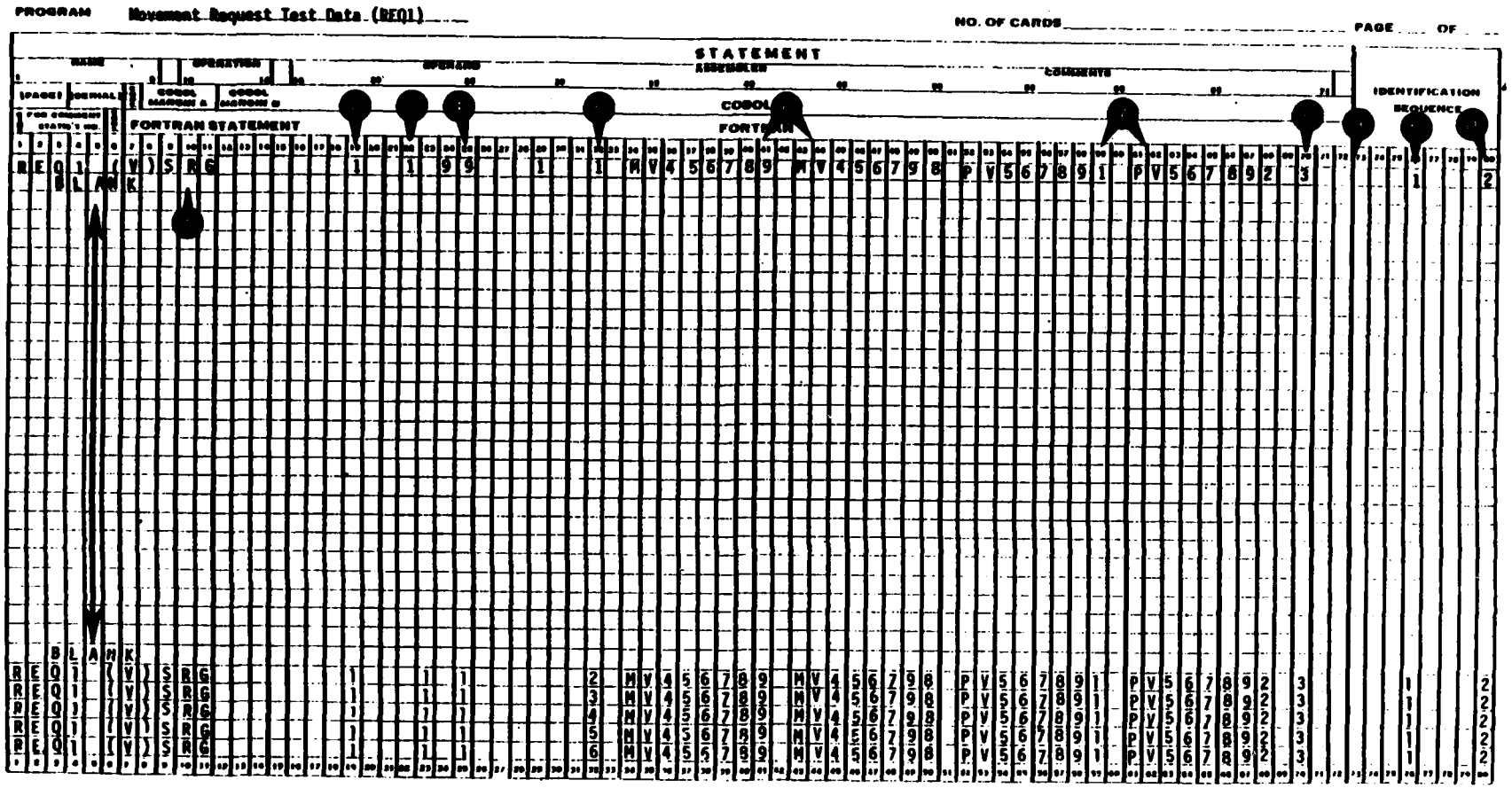


Figure 2–2. Sample REQ1 (Movements Request) Data.

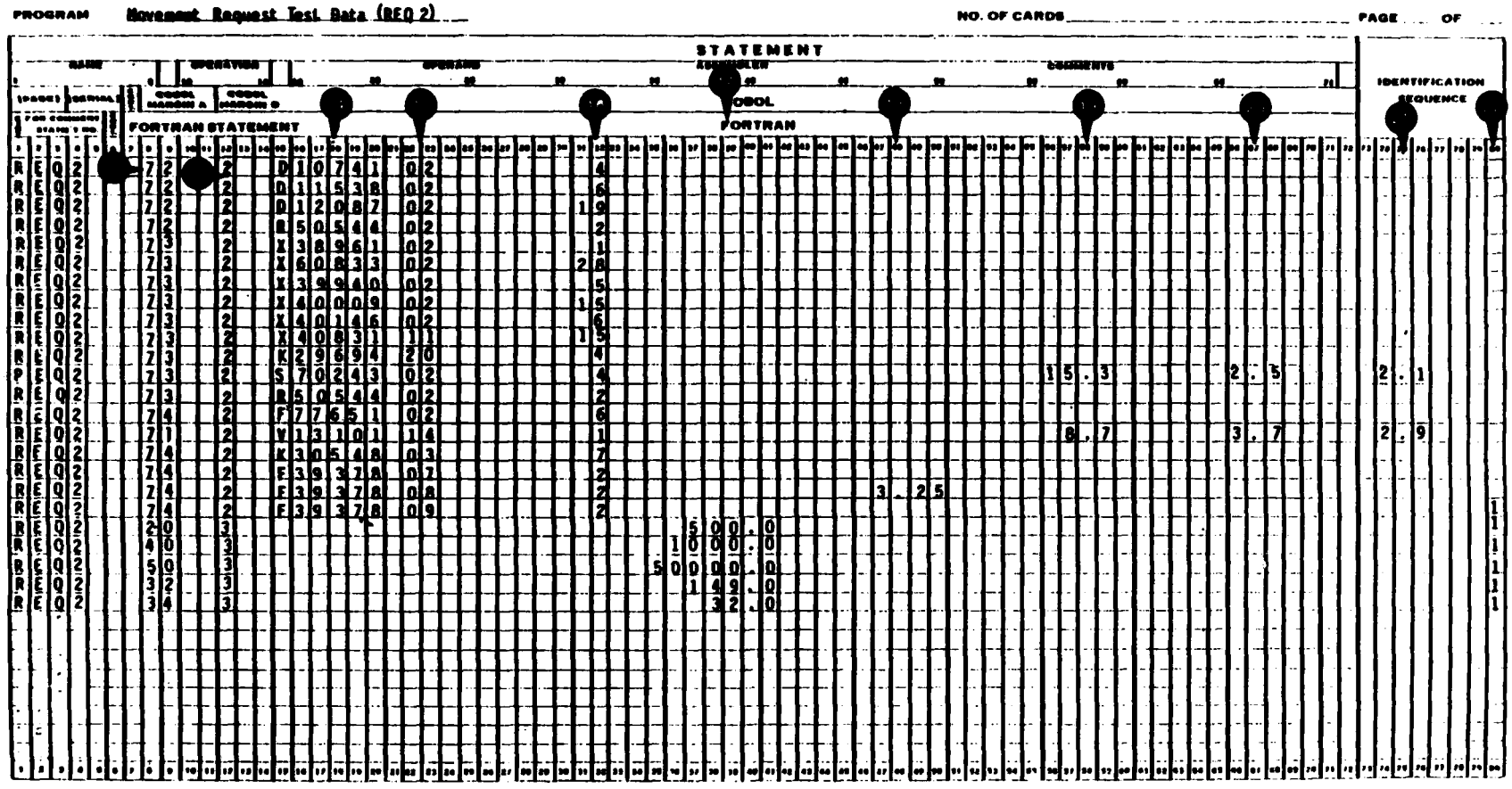


Figure 2–3. Sample REQ2 (Movements Request) Data.

2-3.1.1 REQ1 Card (Movement Request). The REQ1 Card is designed to contain elements of the movement which are common to the movement and are not item peculiar. This means that only one REQ1 card is required for each supporting movement request form. This significantly reduces the preparation work required of the analyst and reduces the storage space required in the computer. The specific identity, field and description for each entry are shown below.

Columns	Field	Entry Description
1-4	A4	REQ1 (Name of type card used by the computer to create appropriate files)
5		Blank
6-15	A10	Alert Stage (information item)
16		Blank
17-19	I3	Required Movement day (starting day for shipments in primary alert stage)
20		Blank
21-22	A2	Frequency of movement of this type if there are multiple identical shipments. Basis for repetition, e.g., ID = Daily, 2D = Every 2nd Day, 3D = Every 3d Day
23		Blank
24-25	I2	Number of shipments if there are multiple shipments (e.g., 01 = one shipment, 14 = fourteen shipments
26		Blank
27	I	Unprogrammed Movement Indicator (information item)

Columns	Field	Entry Description
28		Blank
29-32	A4	Line number for this specific request. Numbers are sequential beginning with 1 and are used for program management and later identification not for load sequencing.
33		Blank
34-41	A8	Shipper grid coordinates
42		Blank
43-50	A8	Shipper transshipment location grid coordinates if transshipment is required (railhead, airfield, barge dock, etc.).
51		Blank
52-59	A8	Receiver grid coordinates
60		Blank
61-68	A8	Receiver arrival location grid coordinates if transshipment is required.
69		Blank
70	I	Mode (1 = air, 2 = barge, 3 = rail, 4 = military wheeled, 5 = civilian wheeled)
71		Blank
72	I	Priority of shipment (not currently used)
73		Blank
74-76	I3	Date available to load (information item which is same as columns 17-19 (movement day) above.
77		Blank
78-80	I3	Required Delivery Day (RDD)/unload (information item)

2-3.1.2 REQ2 Card (Movement Request). The REQ2 Card is designed to contain the elements of information required to enable the computer to identify the individual item to be loaded, to classify it, dimension it, if required, and to properly load it on an appropriate cargo carrier for the specified mode. The specific identity, field and description for each entry are shown below.

Columns	Field	Entry Description
1-4	A4	REQ2 (Name of type card used by the computer to create appropriate files)
5-6		Blank
7-9	I3	Class of item of supply (use following conversion table) Class I dry = 11 Class I chill = 12 Class II = 20* Class III Package = 31 Class III Diesel Fuel = 32 Class III MOGAS = 33 Class III JP4 = 34 Class III AVGAS = 35 Class IV = 40* Class V = 50* Class VI = 60* Class VII = 70* Class VIII = 80* Class IX = 90* Personnel Replacements = 100* Unit Moves = 110* NEO w/bags = 120* Reinforcements = 130*
10-11		Blank

Columns	Field	Entry Description
12	I	Load types 1 = Unit moves (Class VII or PAX) 2 = Oversize/outsize, all vehicles included in load plan, any materiel the shipper identifies as a loading problem because of weight or dimension. 3 = All other moves
13-14		Blank
---------- If not a unit move ----------		
15-20	A6	LIN (A six-character alphanumeric identification of a generic nomenclature). An entry is required if this is not a bulk class movement and if a model number is required in output. If not a bulk movement and a model number is not required in output and dimensions and weight are provided, the LIN is not required.
21		Blank
22-23	I2	Index number which further delineates the specific variation of the generic item defined by the LIN.
---------- If unit move ----------		
15-23	A9	SRC, if unit move. The units listed here must also be on the supporting SCR unit list which has been developed especially for this loading program.** If a matching SRC is not available but its subordinate type units are on the tape, the unit can be unrolled and separate movement cards can be input for each subordinate unit to be moved. Alternatively, the

Columns	Field	Entry Description
		equipment and personnel can be individually listed by type on REQ2 cards as for any other type movement. In any event, the personnel for this movement must be added as a separate entry as the supporting type contains only major items of equipment. If the unit is to be moved with its basic load of ammo, fuel, rations, etc., then these must be entered on separate REQ2 cards.
24-27		Blank
28	I	Organization level (ALO) Authorized Level of Organization if unit move (information item)
29		Blank
30-32	I3	Total number of items/PAX requested (0-999)
33-34		Blank
35-41	G7.0	Total weight in metric tons.*** If a quantity > 1 is contained in columns 30-32, this is total weight for a single item of this type. If this is a bulk item and only cube and class is known, the program will use standard factors to convert to metric tons. If item is bulk POL, quantity is in

Columns	Field	Entry Description
		1,000's of gallons, which the program will convert to MTONS using standard conversion factors.
42-43		Blank
44-50	G7.0	Total cube in cubic meters.**** If a quantity > 1 is contained in columns 30-32, this is the total cube for a single item of this type. If this is a bulk item and only weight and class is known the program will use standard factors to convert the total weight to cubic meters. If item is bulk POL, no entry is required.
51-52		Blank
53-59	G7.0	Length (in meters).**** If bulk item, no entry is made.
60-61		Blank
62-68	G7.0	Width (in meters).**** If bulk item, no entry is made.
69		Blank
70-76	G7.0	Height (in meters).**** If bulk item, no entry is made.
77		Blank
78	I	Stackable. This entry indicates whether other items can be stacked on this item and whether this item can be stacked on other items. Enter "1" to indicate stackable. Enter "0" or leave blank for non-stackable.

Columns	Field	Entry Description
79		Blank
80	AI	End of order indicator. Enter non-blank on the last REQ2 card for each set of Requirement 1, 2 cards. All others should be blank.

FOOTNOTES:

*These classes can also be subcategorized, e.g., class 70 could be represented by 71 = tanks and other large, heavy vehicles; 72 = other tracked vehicles; 73 = wheeled vehicles; 74 = other class VII items. To do this corresponding load preferences must be included in the load preference table (paragraph 3-3.3).

**A listing of these units and the supporting file is available by contacting USALOGCEN ATTN: ATCL-OPT.

***For items which have unique dimensions and are to be individually loaded the dimensions including item cube do not have to be indicated as long as the LIN (Line Identification Number) is recorded in column 15-20 and the supporting equipment data tape contains the required LIN and information.

****For items which have unique dimensions and are to be individually loaded dimensions including item cube do not have to be indicated as long as the LIN is recorded in column 15-20 and the supporting equipment data tape contains the required LIN and information.

2-3.2 VEH1 Card (Vehicle Dimensions).

The VEH1 Card is designed to contain the elements of information required to enable the computer to determine the exact load dimensions, capacities and door restrictions, if any. The specific identity, field and description for each entry is shown below. An example worksheet is shown in Figure 2-4.

Columns	Field	Entry Description
1-4	A4	VEH1 (Name of card type used by the computer to create the appropriate file)
5		Blank
6-8	I3	Vehicle sequence number (0-99). Sequence numbers 1-20 are allocated to air; 21-40 are allocated to barge; 41-60 are allocated to rail; 61-80 are allocated to military wheeled; and 81-99 are allocated to civilian wheeled.
9		Blank
10-21	A12	Vehicle name (i.e., descriptive nomenclature, model type, etc.) for later information only.
22-26		Blank
27-32	F6.2	Empty vehicle weight (MTONS)
33		Blank
34-39	F6.2	Maximum load capacity (MTONS or 1000's gallons if tanker)
40-41		Blank
42-46	F5.2	Total vehicle length (in meters)
47-48		Blank
49-53	F5.2	Vehicle cargo length (in meters)
54		Blank
55-59	F5.2	Vehicle cargo width (in meters)
60-61		Blank
62-65	F4.2	Vehicle cargo height (in meters)
66		Blank
67-69	I3	Passenger capacity (0-999)
70-71		Blank

Columns	Field	Entry Description
72-75	F4.2	Loading door width (in meters)
76		Blank
77-80	F4.2	Loading door height (in meters)

PROGRAM LOOVEH 'VEHICARDS' (6000) NO. OF CARDS PAGE OF

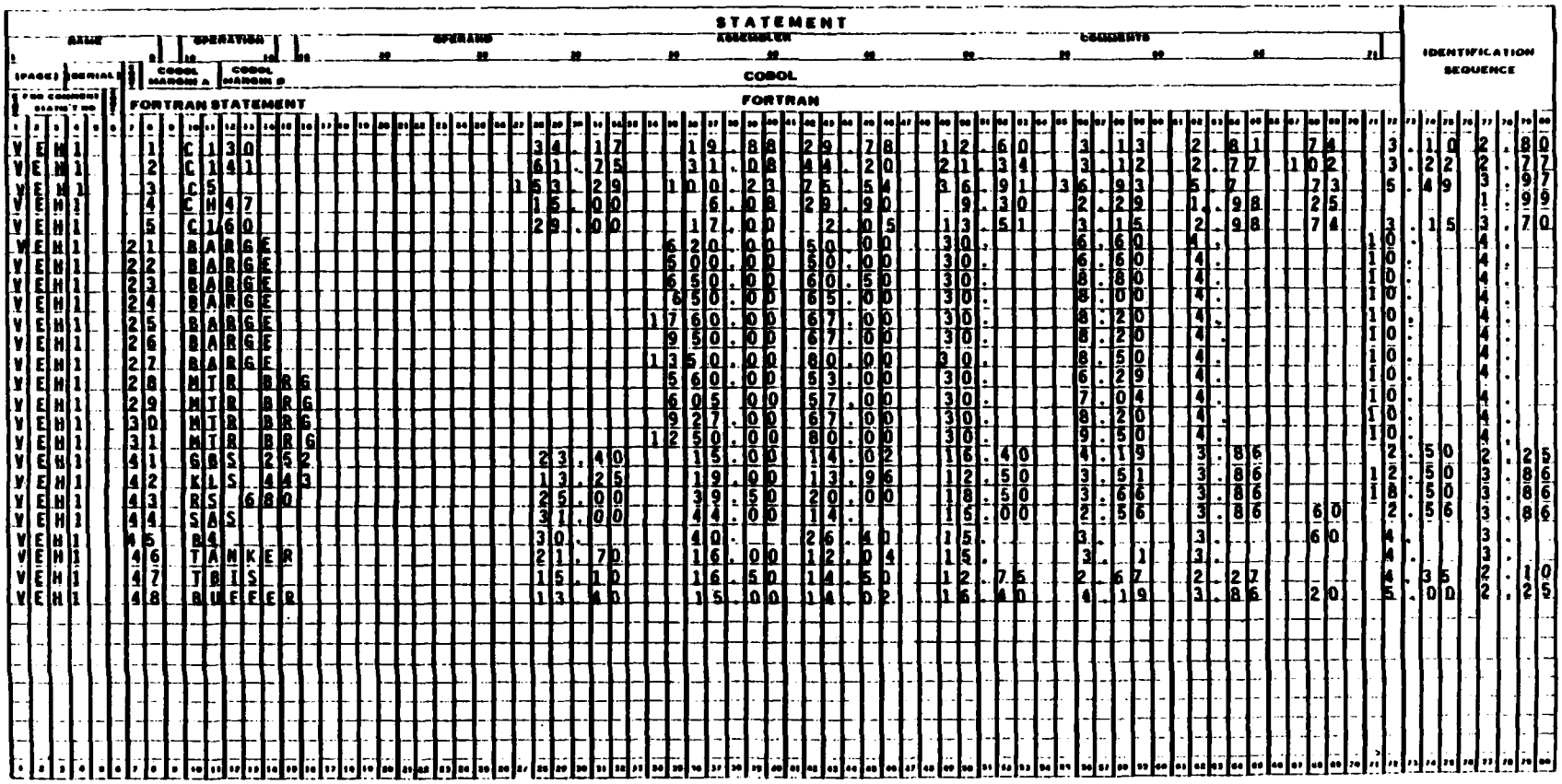


Figure 2–4. Sample VEH 1.

VEHICLE DIMENSION DATA (VEH1 CARDS):

COLUMN:	1	2	3	4	5	6	7	8	9	10
IVTYPE:	1	2	3	4	5	0	0	0	0	0
VEHNAM:	C130	C141	C5	CH47	C160					
EMPWT:	34.17	61.75	153.29	15.00	29.00	0.00	0.00	0.00	0.00	0.00
VMAXLD:	19.88	31.08	100.23	6.08	17.00	0.00	0.00	0.00	0.00	0.00
OVERLG:	29.78	44.20	75.84	29.90	2.05	0.00	0.00	0.00	0.00	0.00
VEHLEN:	12.60	21.34	36.91	9.10	13.51	0.00	0.00	0.00	0.00	0.00
VEHWID:	3.13	3.12	36.93	2.29	3.15	0.00	0.00	0.00	0.00	0.00
VEHIGH:	2.81	2.77	5.70	1.98	2.98	0.00	0.00	0.00	0.00	0.00
IPASSC:	74	102	73	25	74	0	0	0	0	0
VDORWD:	3.10	3.22	5.49	0.00	3.15	0.00	0.00	0.00	0.00	0.00
VDORHT:	2.80	2.77	3.97	1.99	3.70	0.00	0.00	0.00	0.00	0.00
VEHCUB:	110.82	184.43	7769.59	42.17	126.82	0.00	0.00	0.00	0.00	0.00

COLUMN:	11	12	13	14	15	16	17	18	19	20
IVTYPE:	0	0	0	0	0	0	0	0	0	0
VEHNAM:										
EMPWT:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
VMAXLD:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OVERLG:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
VEHLEN:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
VEHWID:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
VEHIGH:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
IPASSC:	0	0	0	0	0	0	0	0	0	0
VDORWD:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
VDORHT:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
VEHCUB:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

COLUMN:	21	22	23	24	25	26	27	28	29	30
IVTYPE:	21	22	23	24	25	26	27	28	29	30

Figure 2-4.1. Sample Output Vehicle Dimensions Data.

2-3.3 LODP Card (Load Preference).

The Load Preference File is a two-card record used to identify loading preferences for different type vehicles. A description of Figure 2-5 and 2-5.1 follows.

The LODP File allows the computer to select, by order of preference, vehicles within the specific modes, for a particular type cargo. The class of supply listed on the REQ2 card (Col 7-9 para 2-3.1.2) is shown in Column 7-9 Figure 2-5. The vehicle modes sequence numbers and associated column numbers are specified in Column 11-80 and 10-48 above. The vehicle types to be used within a mode are input with the Vehicle 1 card (Figure 2-4). In Figure 2-5 and 2-5.1, the intersection of columns 11-80 and 10-48 (each possibly representing a vehicle type) and the lines (on which the supply classes 11, 12, - 130 are entered) provide a block in which to record up to 5 vehicle type preferences within each mode. In Figure 2-5, placing the integer 1 in the block formed by the intersection of column 11 and the line on which supply class 31 is located indicates that the user prefers to use C-130 aircraft to transport package POL when he uses the air mode. A 2 placed in the block formed by the intersection of column 52 and the line of supply class 70 indicates the user's second choice for transporting class VII by rail mode is the KLS railcar. The loading program will select the number one preference in every case unless the cargo is not compatible with the vehicle size. When a piece of cargo is too large for a vehicle, the number two preferred vehicle for that class of supply within a mode, will be selected up to the #5 preferred vehicle. If none of the five preferred vehicles will accommodate the cargo, an error will be indicated. An example, the LODP input data is shown at Figure 2-5.

PROGRAM LODLP (LOOP PREFERENCE) NO. OF CARDS PAGE OF

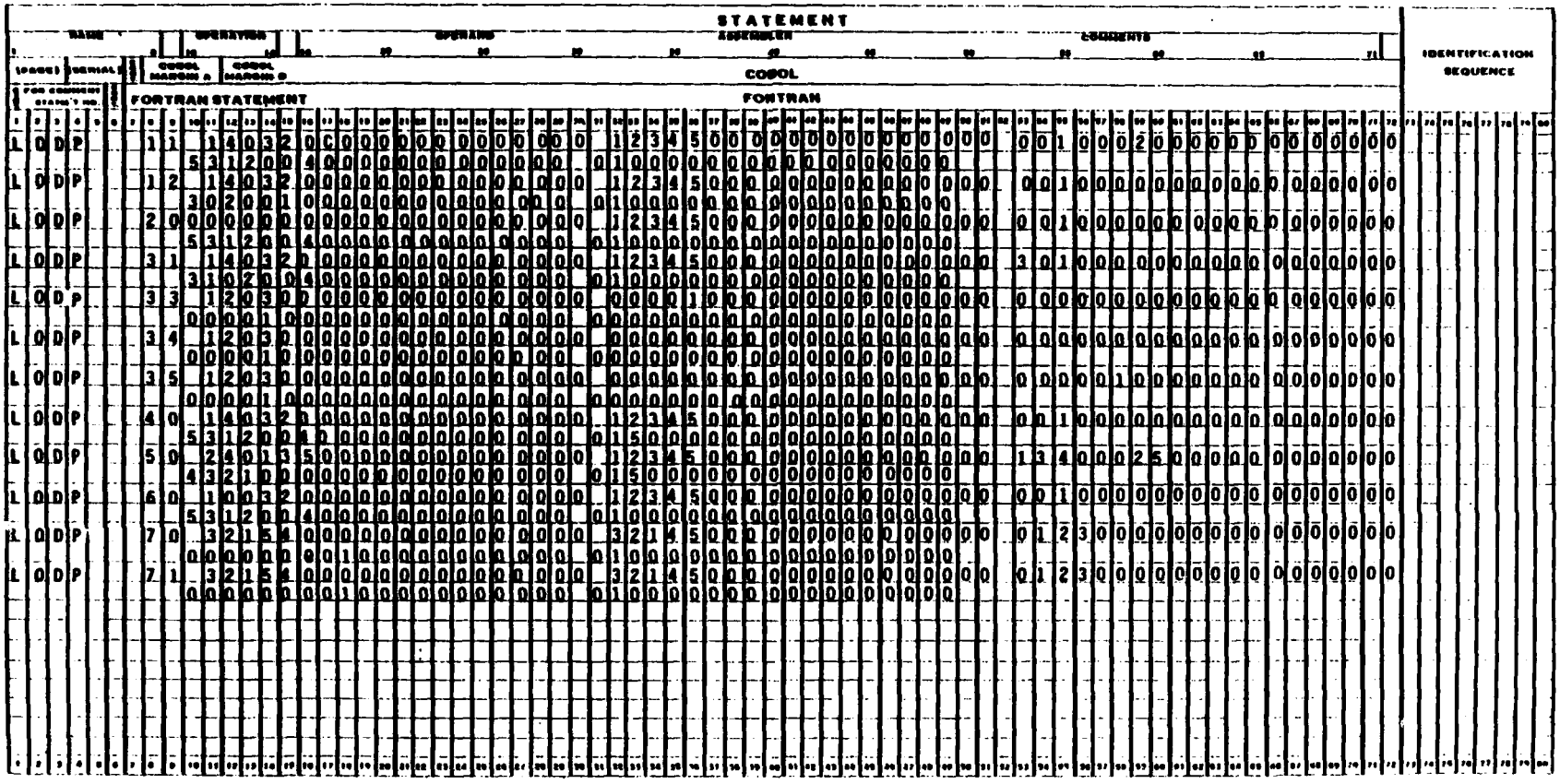


Figure 2–5. Sample LODP.

Columns	Field	Entry Description
1-4	A4	LODP
5-6		Blank
7-9	I3	Vehicle Type
10		Blank
11-8Ø	6ØI1	Air Mode, Vehicle # 1-2Ø: Use columns 11-30* Water Mode, Vehicle # 21-4Ø** Use columns 31-5Ø Rail Mode, Vehicle # 41-6Ø*** Use columns 51-8Ø
1-9		Blank
1Ø-48	59I1	Mil. HWY, Vehicle # 61-8Ø**** Use columns 1Ø-29 Civ. HWY, Vehicle # 81-99***** Use columns 3Ø-48

*Example: Col 11 = C130 A/C, Col 12 - C141 A/C etc. up to 20 type A/C

**Example: Col 31 = 630 Ton Barge, Col 32 = 500 Ton Barge etc. up to 20 type Barges

***Example: Col 51 = GBS Railcar, Col 52 = KLS Railcar etc. up to 20 type Railcars

****Example: Col 10 = 2.5T Trk, Col 11 = 5T Trk etc. up to 20 type mil Trk

*****Example: Col 30 = LKW 10T Trk, Col 31 = Satte/ZUG (Heavy lift Host Nation Trk) etc. up to 20 type Civ Trk

LOAD PREFERENCE TABLE:

CLASS 11	1403200000000000000	1234500000000000000	0010002000000000000	5312004000000000000	0100000000000000000
CLASS 12	1403200000000000000	0000000000000000000	0000000000000000000	3020010000000000000	0100000000000000000
CLASS 20	1003200000000000000	1234500000000000000	0010000000000000000	5312004000000000000	0100000000000000000
CLASS 31	1403200000000000000	1234500000000000000	3010002000000000000	3102004000000000000	0100000000000000000
CLASS 32	1203000000000000000	0000000000000000000	0000010000000000000	0000100000000000000	0000000000000000000
CLASS 33	1203000000000000000	0000000000000000000	0000010000000000000	0000100000000000000	0000000000000000000
CLASS 34	1203000000000000000	0000000000000000000	0000010000000000000	0000100000000000000	0000000000000000000
CLASS 35	1203000000000000000	0000000000000000000	0000010000000000000	0000100000000000000	0000000000000000000
CLASS 40	1403200000000000000	1234500000000000000	0010000000000000000	5312004000000000000	0100000000000000000
CLASS 50	2401350000000000000	1234500000000000000	1340002500000000000	4321000000000000000	0150000000000000000
CLASS 60	1003200000000000000	1234500000000000000	0010000000000000000	5312004000000000000	0100000000000000000
CLASS 70	3215400000000000000	3214500000000000000	0123000000000000000	0000000010000000000	0100000000000000000
CLASS 71	3215400000000000000	3214500000000000000	0123000000000000000	0000000010000000000	0100000000000000000
CLASS 72	1453200000000000000	2134500000000000000	1234000000000000000	0003000210000000000	0100000000000000000
CLASS 73	1403200000000000000	1234500000000000000	1234000000000000000	0003000210000000000	0000000000000000000
CLASS 78	0000000000000000000	0000000000000000000	0010000000000000000	0000000030000000000	0000000000000000000
CLASS 79	0000000000000000000	0000000000000000000	0001000000000000000	0000000000000000000	0000000000000000000
CLASS 80	1403200000000000000	1234500000000000000	0010000000000000000	0000000000000000000	0000000000000000000
CLASS 90	1403200000000000000	1234500000000000000	0010000000000000000	0000300000000000000	0000000000000000000
CLASS 100	1304200000000000000	0000000000000000000	0000100000000000000	0001000000000000000	0000000000000000000
CLASS 110	4215300000000000000	0000000000000000000	1234000000000000000	0000000000000000000	0000000000000000000
CLASS 120	4210300000000000000	0000000000000000000	0000100000000000000	0001000000000000000	0000000000000000000
CLASS 130	1003200000000000000	0000000000000000000	0000100000000000000	0001000000000000000	0000000000000000000

Figure 2-3.1. Output Sample Lead Preference.

2-3.4 LOD1 Card (Load Plan).

One of the requirements associated with the USAREUR Wartime movements program is to provide information to the German Railway authorities as to the specific load characteristics. To formalize this process the authorities have developed and USAREUR uses a so called "ordinal number." Each of these ordinal numbers has a specific combination of load and type railcar. In order to provide this same capability with the loading routine a description of these type loads is input and prior to outputting the results of the loading routine this list is scanned for matches between actual planned loads and ordinal number type loads. It is possible to have more than one combination of loads and carriers with the same ordinal number. The data contained in this file is shown below. An example data form is at Figure 2-6.

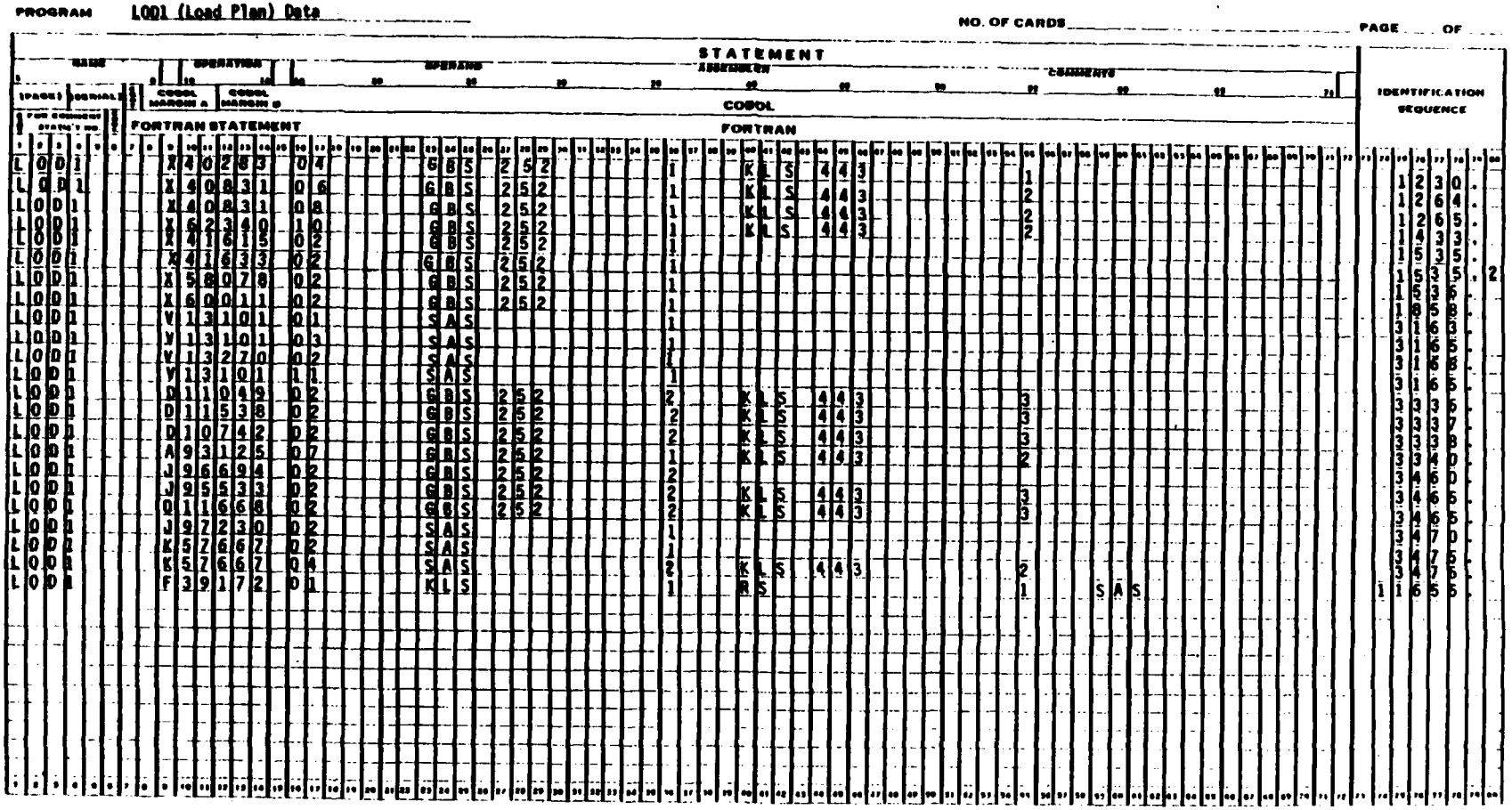


Figure 2–6. Sample LOD1 (Load Plan) Data.

Columns	Field	Entry Description
1-4	A4	LOD1 (Name of card type used by the computer to create the appropriate file)
5-8		Blank
9-14	A6	LIN number (A six-character alphanumeric identification of a generic nomenclature - model number will not suffice). The same LIN numbers used in REQ2 Cards should also be here if an ordinal number load is appropriate.
15		Blank
16-17	I2	Index number which further delineates the specific variation of the generic item defined by the LIN number.
18-21		Blank
22-33	A12	Vehicle type - must correspond to vehicle types defined in VEH1 card.
34-35		Blank
36	I	Quantity of this LIN that can be loaded on this vehicle type.
37-39		Blank
40-51	A12	Vehicle type - must correspond to vehicle types defined in Veh1 card.
52-54		Blank
55	I	Quantity of this LIN that can be loaded on this vehicle type.
56-58		Blank
59-70	A12	Vehicle type - must correspond to vehicle types defined in VEH1 card.
71-72		Blank
73	I	Quantity of this LIN that can be loaded on this vehicle type.
74		Blank

Columns	Field	Entry Description
75-80	F6.1	Ordinal number - a specific number developed for use with the German Railway System to identify type loads.

2-3.5 LOC1 (Physical Location Information).

The LOC1 (Physical Location Information) data card is designed to contain information which will permit translation of grid coordinates into a simplified numeric location code. This simplified code makes computer processing and transfer of information easier. The specific code used is based upon the DAMSEL (Data Management and Selection) system. The specific identity, field and description for each entry is shown below. An example worksheet is shown in Figure 2-7.

PROGRAMMER LOC1 (Physical Information) Data NO. OF CARDS PAGE OF

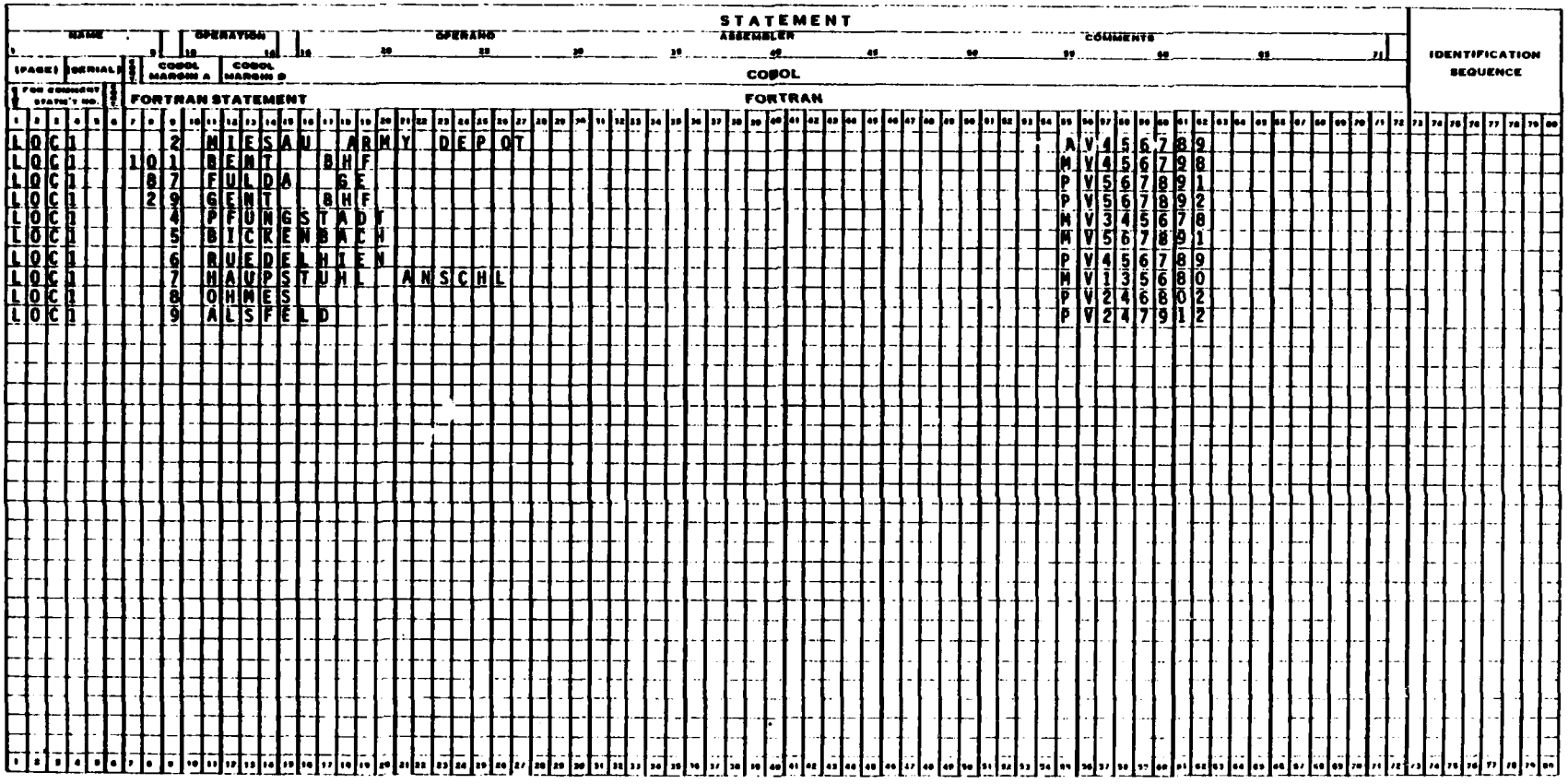


Figure 2–7. Sample LOC1 (Physical Location) Data.

Columns	Field	Entry Description
1-4	A4	LOC1 (Name of card type used by the computers to create the appropriate file).
5-6		Blank
7-9	I3	DAMSEL location sequence number
10		Blank
11-50	A40	Location name
51-54		Blank
55-62	A8	Location of UTM Grid coordinates

2-3.6 SRCFIL (SRC File).

The SRC File is designed to contain information on the oversized/outsized equipment authorized a TOE unit. Use of this file in movements planning reduces the amount of data required as analyst input. This file contains the SRC number followed by a roll-up of equipment by LIN and the quantity authorized at Level 1. The format used is the same as the file produced from a (FORSCON) Computerized Movement Planning and Status System (COMPASS) for organizations, and TRADOC Master TOE or Modification Table of Organization and Equipment File (MTOE) for equipment.

2-3.7 EQPFIC (Equipment Characteristic File).

The Equipment Characteristic File is an especially designed file of selected data extracted from the Army's central equipment characteristic file. This data includes the LIN including index number, equipment dimensions (length, width, height, weight and cube) and model number. The specific identity, field and description for each entry is shown below.

Columns	Field	Entry Description
1-9	9A	Equipment item LIN number (6 characters), blank and index number (2 characters).
10		Blank
11-16	F6.1	Equipment item length in inches.
17		Blank
18-23	F6.1	Equipment item width in inches.
24		Blank
25-29	F5.1	Equipment item height in inches.
30		Blank
31-37	I7	Equipment item weight in pounds.
38		Blank
39-46	F8.1	Equipment item cube in cubic inches.
47		Blank
48-60	A13	Equipment item model number.

SECTION 3
REPORTS

3-1 GENERAL.

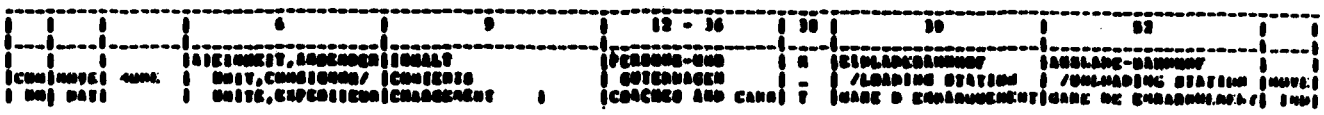
In order to satisfy the reports requirements for the USAREUR Wartime Movements Program and other similar planning uses of this loading program and to generate the necessary input files required to support the TRANATAK model, two distinct report systems have been designed into this program. The choice of outputs is designated by the analyst prior to model execution. This choice includes the capability to request a combination of the two report systems.

3-2 MOVEMENTS PROGRAM FORMATS.

Two output formats are produced for the movements program application. These include a modified version of the European Railroad Systems' ANMELDELISTE and a detailed description of each load combination (a convoy listing).

3-2.1 ANMELDELISTE.

The primary report generated by this model in support of the transportation planning function is a modified version of the European Railroad Systems' ANMELDELISTE. An example of the modified ANMELDELISTE output format is shown in Figure 3-1. The numbered columns in the heading correspond to the ANMELDELISTE headings. Others have been added to present additional data which is needed for clarity or cross reference. In order to provide a listing which provides the transportation planners with specific requirements and eliminates possible redundancies in the number of transportation carriers used in the loading process, the requirements for each separate convoy are summarized in this report. Explicit loading and cross-referencing to the line number provided on the input REQ1 card is provided. The specifics of the data represented in this report are discussed below:



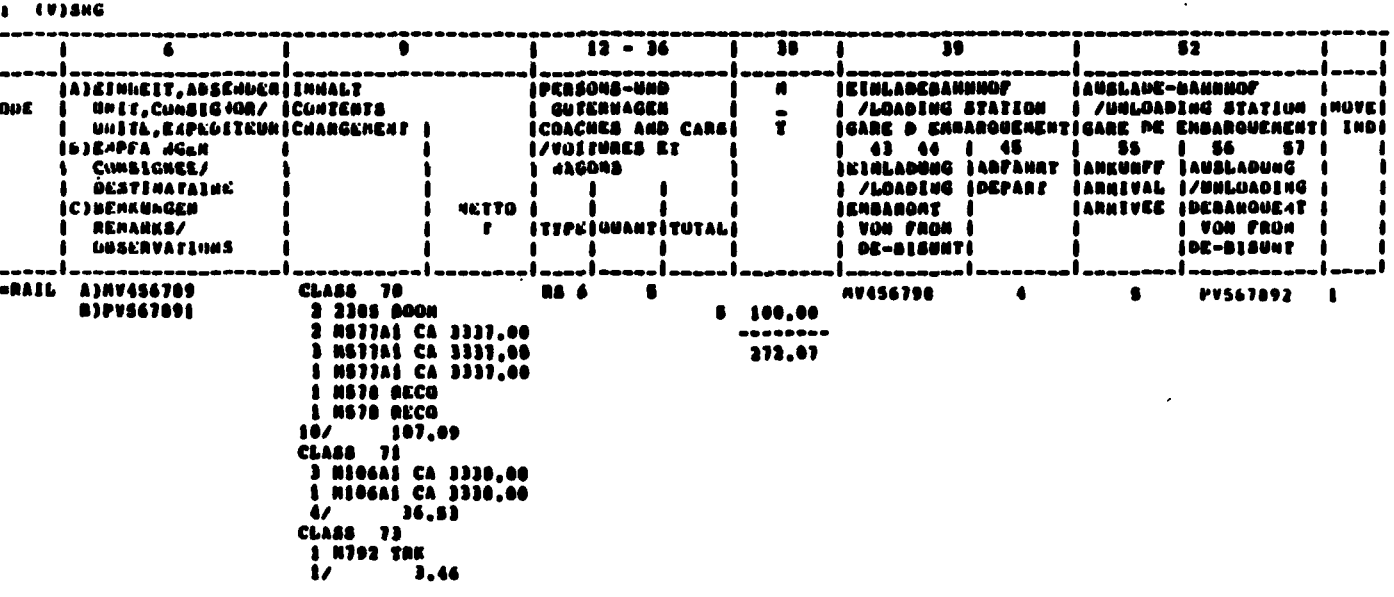


Figure 3-1. Anmeldeliste Output Format.

Column	Description
Alert Stage	Copied from original input (pass thru no processing).
Convoy #	Corresponds to model generated convoy number and provides a means to correlate this report with convoy listing.
Move Day	Sequencial day of alert stage, that first shipment is required.
Mode (of transportation)	A single integer number for each convoy identifying its mode (1 = air, 2 = barge, 3 = rail, 4 = military wheeled, and 5 = civilian wheeled).
Origin, Destination and Remarks (column 4 of ANMELDELISTE)	Grid coordinates of origin and destination. A line is also provided for alphanumeric remarks.
Contents of movement (column 9 of ANMELDELISTE)	Materiel description (model # if appropriate) by class, ordinal #, and SRC if unit move. Also included is a summary showing the total number of passengers/total number of items and net tons of convoy under NETTO T.
Type vehicle, quantity and (column 12 - 36 of ANMELDELISTE)	The type and quantity by type is entered for each type carrier used to make up the convoy. The total number of carriers of all types is also provided.

Total weight and length (column 38 of ANMELDELISTE)	This entry is provided for trains only and consists of the total length of the loaded train in meters on the top and below that the total weight of the loaded train including the rail cars.
Loading station (column 39, 43, 44 of ANMELDELISTE)	Origin loading point. Entry only if a railhead, barge loading dock, airfield or other transshipment point is indicated on the REQ1 card.
Day of Shipment (column 45 of ANMELDELISTE)	Shipment date from start of simulation.
Unloading Station (columns 52, 56 and 57 of ANMELDELISTE)	Destination unloading point. Entry only if a railhead, barge loading dock, airfield or other transshipment point is indicated on the REQ1 card.
Day of Receipt (column 55 of ANMELDELISTE)	Receipt date from start of simulation. This date is calculated to be one more than the shipment date.
Movement Indicator	If report is for a preprogrammed movement, else its blank.

3-2.2 Convoy Listing.

An example of the convoy listing output format is shown in Figure 3-2. This report is designed to provide a detailed representation convoy (train) by convoy (train) of the loads placed on each element of that convoy (train).

Rows	Columns	Description
1	General information.	
	1	Convoy number
	2	Shipment date
	3	Origin of movement by name and co-ordinates.
	4	Destination of movement by name and coordinates.
	5	Mode (1 = air, 2 = barge, 3 = rail, 4 = military wheeled, 5 = civilian wheeled.)
2 - to last element	Description of carrier and contents.	
	1	Element type which equates to VEH1 card types.
	2 - to last item	Series of entries which contain data on the: • LIN of item or class if bulk or personnel • Quantity of this item • Line number for reference back to the appropriate REQ1 card.

CONVOY LISTING

Convoy# _____ Date _____ Origin _____ Destination _____ Mode _____

ELEMENT __ (TYPE): ITEM/QUANT/LINE# _____ _____ _____

_____ _____ _____ _____ _____

_____ _____ _____ _____ _____

CONVOY # 1 DATE : 4 ORIGIN : MV456798 DESTINATION :PV567892 MODE : 3= RAIL
VEHICLE 43 RS 680 : ITEM/QUANTITY/LINE# D10741 02/ 3 / 1 F39378 08/ 2 / 1
VEHICLE 43 RS 680 : ITEM/QUANTITY/LINE# D10741 02/ 1 / 1 D11538 02/ 2 / 1
VEHICLE 43 RS 680 : ITEM/QUANTITY/LINE# D11538 02/ 3 / 1
VEHICLE 43 RS 680 : ITEM/QUANTITY/LINE# D11538 02/ 1 / 1 R50544 02/ 1 / 1
X38961 02/ 1 / 1
VEHICLE 43 RS 680 : ITEM/QUANTITY/LINE# R50544 02/ 1 / 1

Figure 3-2. Convoy Listing Output Format and Sample.

3-3 TRANATAK MODEL INPUT DATA AND REPORTS.

Two output products are produced for the TRANATAK application of this program. The first is a computer tape which contains the elements of data input to or generated by this loading routine which are also needed by TRANATAK. The second output provided for this application is a hard copy printout of the information contained on the tape.

3-3.1 Tape Format.

The tape will be prepared to reflect the following two card file format.

First Card

Columns	Field	Description
1-5	A5	Card Name (SHPMT)
6-7	I2	Primary Card - 1 entered
8-10	3X	Blank
11-20	F10.0	Time of Shipment (Input)
21-24	4X	Blank
25-27	I3	Origin Technical Number (DAMSEL Code)
28-30	I3	Destination Terminal Number (DAMSEL Code)
31-40	F10.0	Enter 0.0 (Return Pointer)
41-47	I7	Class Designation (Input)
48-50	I3	Event Type Code
51-60	F10.0	Weight of Shipment
61-70	F10.0	Priority
71-80	F10.0	Cube of Shipment

Second Card

Columns	Field	Description
1-5	A5	Card Name (SHPMT)
6-7	I2	Continuation Card - 2 entered
8-30		23XUnprogrammed Movements Indicator
31-33	I3	Required delivery date. Equals time of shipment plus one day.
34-39	I6	Convoy number
40	1X	Blank
41	I	Item load type (1 = descrete, 2 = bulk)
42-50	9X	Blank
51-52	I2	Vehicle sequence number of type used for this load
53-55	3X	Blank
56-58	I3	Number of vehicles used for this shipment
59-60	2X	Blank
61-62	I2	First Alternate Vehicle Sequence Number
63	X	Blank
64-65	I2	Second Alternate Vehicle Sequence Number
66	X	Blank
67-68	I2	Third Alternate Vehicle Sequence Number
69	X	Blank
70-71	I2	Fourth Alternate Vehicle Sequence Number
72	X	Blank
73-74	I2	Fifth Alternate Vehicle Sequence Number

3-3.2 TRANATAK Output Format.

The output from the tape generated above will be printed out in the format contained in Figure 3-3.

Time of Shpmt	Origin	Destination	RETS	Class	Event type	WT	Priority	Cube	Un-Pro move	RDD	Convoy #	Item Load type	Pri	Qty	Vehicle Sequence Number 1st Alt	2nd Alt	3rd Alt	4th Alt	5th Alt
		SHPMT 1		4.		101	29	0.		71	0	27.4			9.		78.8		
		SHPMT 2					1 2	0 1			43		42	43 44	0	0			
		SHPMT 1		4.		101	29	0.		70	0	1.3			9.		6.3		
		SHPMT 2					1 2	0 1			43		42	43	0	0	0		
		SHPMT 1		4.		101	29	0.		71	0	9.1			9.		26.3		
		SHPMT 2					1 2	0 1			43		42	43 44	0	0			
		SHPMT 1		4.		101	29	0.		70	0	20.3			9.		65.3		
		SHPMT 2					1 2	0 1			43		42	43 44	0	0			
		SHPMT 1		4.		101	29	0.		70	0	30.5			9.		97.9		
		SHPMT 2					1 2	0 1			43		42	43 44	0	0			
		SHPMT 1		4.		101	29	0.		70	0	10.2			9.		32.6		
		SHPMT 2					1 2	0 1			43		42	43 44	0	0			
		SHPMT 1		4.		101	29	0.		70	0	22.4			9.		59.2		
		SHPMT 2					1 2	0 1			43		42	43 44	0	0			
		SHPMT 1		4.		101	29	0.		73	0	3.5			9.		20.2		
		SHPMT 2					1 2	0 1			43		41	42 43	44	0			
		SHPMT 1		4.		101	29	0.		70	0	22.4			9.		59.2		
		SHPMT 2					1 2	0 1			43		42	43 44	0	0			

Figure 3-3. TRANATAK Output Format and Sample.

SECTION 4
MOVEMENT PLANNING MODULE
DESIGN DESCRIPTION

4-1 GENERAL.

This section contains a psuedo-code description of each module of code in the loading program. The purpose of this description is to provide a less technical source of information on the process being represented by the corresponding computer code.

4-2 CONTROL.

Control for the MPM Loading Program is contained in the Load Main (LOADM) program module. This module calls the data preparation and processing routines, begins execution of the loading routines and calls the appropriate report generators.

Load Main (LOADM). The Load Main Module is used to define the type of loading conditions that exist for a specific use of the loading routine.

Modules Needed (MN): USERIN, LODFIL, PERMRQ, SRTMRQ, SRTITM, LODSEQ, RPTOUT

1. Call User Input routine which queries the user concerning reports, trace instructions and array printouts.

2. Call Load File routine which loads all necessary input files.

3. Call Periodic Movement Request routine which breaks out the periodic movements of a specific frequency and content to a supporting array.

4. Call Sort Movement Requests routine which sorts all of the movement requests into a date sequenced array. This array is further sequenced by orgin and destination, mode and type of movement.

5. Call Loading Sequence routine which selects the items to load, adds new transport capability as required, and builds new convoys (trains) by module as needed.

6. If Loading Program reports are required, call Report Generator routine to produce reports.

4-3 INPUT DATA PROCESSING.

The following routines are used to review, develop and process input data for this loading program.

4-3.1 User Input (USERIN) Routine.

The User Input routine is used to review set parameter values, set three values, and set report generation indicators.

4-3.2 Load Files (LODFIL) Routine.

The Load Files routine is used to initialize conditions for loading files and call the appropriate routines to read files into arrays.

Modules Needed (MN): LODSRC, LODEQP, LODWMR, LODDL, LODLP, LODVEH

1. Call Load SRC (LODSRC) routine to read in files containing SRC numbers and authorized oversized/outsized equipment for each unit. This file is then accessed when a unit move is identified and only a SRC is provided.'

2. Call Load Equipment (LODEQP) routine to read in files containing the LIN number, dimensions (length, width, height, weight and cube) of major items of equipment. This file is used to assist the analyst by reducing the amount of analyst-generated input required. It also provides a cross reference to the model number which is needed for output reports.

3. Call Load Wartime Movement Requests (LODWMR) routine to load the wartime movement request file with the individual movement requests and their supporting materiel and personnel lists.

4. Call Load DAMSEL Location (LODDL) routine to load the coded numerical location file which translates the place names of origins and destinations in the wartime movements requests to a number. This number simplifies the sequencing of loading and is needed for data passed to TRANATAK.

5. Call Load Preference (LODLP) routine to load the types of transportation carriers by mode on which each class of supply can be loaded. These types have a preferred order as indicated by the number assigned to the appropriate types.

6. Call Load Vehicle Dimension (LODVEH) routine to load the loading capacity and dimensions for each type carrier that may be loaded for this application of the loading model.

7. Call Load LOD1 (LODLD1) routine to load the vehicle, LIN number, and ordinal number data.

8. Return to calling routine.

4-3.3 Load SRC (LODSRC) Routine.

The Load SRC routine reads the SRC unit file and creates a file of SRC numbers corresponding unit equipment LIN and the quantity of item by LIN.

Common Input (CI): SRC/IPTSRC(NSRC$), ISRCQT(NLIN$), /SRC$/ SRCNUM(NSRC$), SRCLIN-
(NLIN$)

File Input (FI): PARAM.PRM

1. Open the file and read the SRC File for each SRC entry.
   If valid number, continue.
   Otherwise, report error, go to 5.

2. Save ID of highest level SRC of consolidated SRC listing.

3. Read line numbers of equipment
   If valid line number, copy quantity, continue.
   Otherwise, report error, continue.

4. Last line number the SRC?
   If yes, continue.
   If no, go to 3.

5. Last SRC in file?
   If yes, return to calling routine.
   If no, go to 1.

File Output (FO): SRCFIL

4-3.4 Load Equipment (LODEQP) Routine.

The Load Equipment (LODEQP) routine reads in the especially constructed equipment characteristic file. This file provides a source of dimensional data and model numbers to be used by the loading program.

CI: /EQPCHR/LGEQP(NEQP$), WDEQP(NEQP$), HTEQP(NEQP$), WTEQP(NEQP$), CUEQP(NEQP$), /EQPCH$/EQPLIN(NEQP$), MDLEQP(NEQP$)
FI: PARAM.PRM

1. Open the file.

2. Do 3 for each item of equipment.

3. Read in dimensions (length, width, height, weight and cube)

4. Read in model number.

5. Last item.
   If yes, return to calling routine.
   If no, go to 2.

File Output (FO): EQPFIL

4-3.5 Load Wartime Movement Request (LODWMR) Routine.

The Load Wartime Movement Request routine reads in the wartime movement request file, expands the unit movement requirement and checks for required dimensions and model numbers of items.

FI: PARAM.FIL, WMRFIL.PRM, CARDCT.PRM
MN: DMPWMR, PRESRT

1. Do 2 for each REQ1 card (I = 1-999).

2. Read in data from REQ1 card.

3. Compute model movement data from input alert stage and movement date and set movement data equal to the computed date.

4. Do 5 for each supporting REQ2 card (J = 1-999).

5. Read in date for REQ2 card.

6. Read type name.
   If type name = 1 (unit move) and first three elements of model field equal SRC, call Presort routine to expand the REQ2 cards to include all required equipment items.
   Otherwise, continue.

7. If model is not SRC and not blank the item is one that requires unique loading. Otherwise, bulk load or personnel, go to 9.

8. For unique loading items check to see that all dimensions are provided, weight in metric tons, cube (calculate if individual dimensions already provided). If individual dimensions not provided get them from the supporting equipment characteristic file and convert to meters, cubic meters and metric tons. This is done by calling Pre-Dimension routine.

9. Last REQ2 card?
   If yes, continue.
   If no, go to 4.

10. Last REQ1 card?
    If yes, continue.
    If no, go to 1.

11. Call Dump Wartime Movements Request routine if trace is indicated.

12. Return to calling routine.

4-3.6 Presort (PRESRT) Routine.

The Presort Routine is used to read in the equipment for a specific unit whose SRC is identified an REQ2 card of a unit movement. This eliminates the requirement for the analyst to individually list these equipment items but it does require the preparation of a supporting SRC-keyed unit equipment data file . After the equipment dimensions are read in from the unit equipment file, control is returned to routine LODWMR to process the remaining and other materiel such as basic load of rations, packaged class III, ammunition, spare parts, etc.

CI: /SRC/IPTSRC(NSRC$), /SRC$/SRCNUM(NSRC$), SRCLIN(NLIN$)
FI: Unit Equipment File, Equipment Characteristic File

1. Search Unit equipment file to find matching SRC.
   If no match, report no match, return to calling routine.
   Otherwise, continue.

2. Do 3 for each equipment type listed.

3. Create a REQ2 card for each equipment type listed for this unit to include LIN quantity, set class equal to 70, type move equal to one (unit), nonstackable.

4. READ LIN.
If LIN is > 0, call PREDIM routine.
Otherwise, continue.

5. Increment number of items (REQ2) cards counted (NITEMS + 1).

6. Last equipment item?
If yes, and no other REQ2 cards are listed for this REQ1 card, set end of file indicator. Return to calling routine. Otherwise return to calling routine.
If no, go to 2.

FO: WMRFIL.PRM

4-3.7 Pre-Dimension (PREDIM) Routine.

The Pre-Dimension routine matches a given LIN with line numbers in the equipment characteristic file in order to get necessary data for a line number which is:

- Part of a unit move and the equipment has been identified from the SRC unit line number file, or
- A movement request item (REQ 2 Card) without all dimensions.

Model numbers are also obtained by this routine for each unique LIN equipment item.

CI: /EQPCHR/LGEQP(NEQP$), WDEQP(NEQP$), HTEQP(NEQP$), WTEQP(NEQP$), CUEQP(NEQP$), /EQPCH$) EQPLIN(NEQP$), MDLEQP(NEQP$)

FI: PARAM.PRM

SAI: LIN of item

1. Match LIN of item to equipment characteristics listing.
   If no match, report error, delete REQ2 card entry, go to 5.
   Otherwise, continue.

2. Read dimensions from REQ2 card.
   If length, width, height are provided, compute cube, continue.
   Otherwise, read length, width, height and cube, convert to metric and record.

3. Read weight entry from REQ2 card.
   If > 0, continue.
   Otherwise, read weight from file, convert to metric and record.

4. Read and record model number.

5. Return to calling routine.

4-3.8 Load DAMSEL Location (LODDL) Routine.

The Load DAMSEL Location routine reads the DAMSEL Location File (LOC1 cards) and converts Wartime Movement Requests (REQ1) cards' origin and destination (Alpha) data to integer DAMSEL location numbers.

FI: PARAM.PRM, WMRFIL.PRM, CARDCT.PRM, DLFIL.PRM

1. Open DAMSEL Location file (LOC1).

2. Read in DAMSEL location data.

3. Close file.

4. Do 5 for each REQ1 card (i = 1, NMOVRQ).

5. Identify shipper and receiver.

If no entry in second location for each then no transshipment is involved and shipper and receiver are in first location.

Otherwise shipper and receiver identity are in second location respectively.

6. Read DAMSEL code to find DAMSEL code for indicated coordinates.
If no match found, report error, go to 8.
Otherwise, continue.

7. Record shipper and receiver code.

8. Last REQ1 card?
If yes, return to calling routine.
If no, go to 4.

4-3.9 Load Preference (LODLP) Routine.

The Load Preference routine reads in load preference file data (LODP) cards to initialize the LODPRF array which is the load preference table used during loading.

FI: LPFIL.PRM

1. Open LPFIL file.

2. Do 3 for each class (i = 1,130).

3. Read in data on which types of vehicle by mode that this class of supply prefers to be loaded upon.

4. Last class?
If yes, continue.
If no, go to 2.

5. Close file.

6. Return to calling routine.

CO: LODPRF Array.

4-3.10 Load Vehicle Dimensions (LODVEH) Routine.

The Load Vehicle Dimensions routine reads in vehicle dimensions data (VEH1 cards) which establish the load limits for each type vehicle used for loading purposes in this application of the loading module.

FI: PARAM.PRM, VEHFIL.PRM, FILNUM.PRM, CARDCT.PRM.

1. Open VEHFIL.

2. Do 3 for each vehicle type.

3. Copy in load data characteristics including total weight, length, width, height, door dimensions and overall vehicle length.

4. Compute and record vehicle loading cube.

5. Last vehicle type?
   If yes, continue.
   If no, go to 2.

6. Close file.

7. Return to calling routine.

FO: VEHFIL

4-3.11 Load Load Plan (LODLD1) Routine.

The Load Load Plan routine reads in type loads which have been given an ordinal load number by type load. This ordinal number is used in communicating type load information to the European railway authorities via the output reports.

FI: LD1FIL.DAT

1. Open load plan file.

2. Do 3 for each type load.

3. Read in data on LIN of equipment item, the matching rail car type(s) which constitute an appropriate carrier and the assigned ordinal number which identifies this load.

4. Last load type?
   If yes, return to calling routine.
   If no, go to 2.

FO: LODPLA, LODPLI, ORDNUM

4-3.12 Periodic Movement Request (PERMRQ) Routine.

The Periodic Movement Request routine expands the wartime movement requests which are periodic requests so that each becomes an individual request in the expanded movement request array.

FI: PARAM.PRM, CARDCT.PRM, WMRFIL.PRM

1. Do 2 for each REQ1 (i = 1,NMOVRQ).

2. Check movement frequency and number of movements of this type on REQ1 card.
   If both are > 0, continue.
   Otherwise, go to 8.

3. If first movement, set move day in MOVRQ2 equal to first movement date, go to 6.

4. Do 5 for each additional movement.

5. Set movement date in MOVRQ2 equal to last movement date plus movement frequency.

6. Set pointer in MOVRQ2 back to REQ1 array entry.

7. Last movement?
   If yes, continue.
   If no, go to 4.

8. Last REQ1 card?
   If yes, return to calling routine.
   If no, go to 1.

CO: MOVRQ2 Array.

4-3.13 Sort Movement Request (SRTMRQ) Routine.

The Sort Movement Requests routine sorts movement request data (REQ1 cards) by movement date, mode, move/load type, orgin and destination. This sorting occurs after LODFIL routine and before LODSEQ routine. The procedure used permits a column by column walk through of the movement data when it is being loaded and eliminates searching and sorting during the loading process.

FI: PARAM.PRM, CARDCT.PRM, WRMFIL.PRM

1. Do 2 for each entry in expanded wartime movement request file.

2. Search for earliest movement date and find all with that date.

3. Do 4 for each of the entries identified in 2.

4. Find the smallest move/load type or priority load. Type loads include 1 = unit, 2 - oversized/outsized/unique items or 3 = bulk loads.

5. Do 6 for each orgin and destination combination.

6. Sort and group.

7. Do 8 for each mode.

8. Sort and group.

9. Set pointers.

10. Last entry in expanded wartime movements request file?
If yes, return to calling routine.
If no, go to 1.

4-4 LOADING SEQUENCE

The following routines are used to load a particular item on an appropriate carrier and to assemble convoys (trains) which are made up of proper components (elements). Additionally these routines build the arrays which provide the data for output/postprocessing reports.

4-4.1 Load Sequence (LODSEQ) Routine.

The Load Sequence routine is the control or driver routine for the loading process. It selects the items to load, evaluates the type of load it represents, the type carrier on which it is to be loaded, determines the specific convoy and vehicle which appears to accommodate the load and calls the central loading routine to accomplish the loading. In some cases if additional vehicles need to be added to a convoy to accommodate the load this routine adds the vehicle and if new convoys are required it creates them.

FI: PARAM.PRM, CUBDEF.PRM, CARDCT.PRM, LODING.PRM, WMRFIL.PRM, LPFIL.PRM, VEHFIL.PRM, NMAXEL.PRM

MN: LDCONV

1. Build an appropriate convoy for a new set of movement attribute load and calls the central loading routine to accomplish the loading. In some cases if additional vehicles need to be added to a convoy to accommodate the load this routine adds the vehicle and if new convoys are required it creates them.

FI: PARAM.PRM, CUBDEF.PRM, CARDCT.PRM, LODING.PRM, WMRFIL.PRM, LPFIL.PRM, VEHFIL.PRM, NMAXEL.PRM

MN: LDCONV

1. Build an appropriate convoy for a new set of movement attributes.

2. Establish data necessary for a movement request to be loaded on a convoy.

3. Do 4 for each item listed for a REQ1 card, i.e., all of the supporting REQ2 cards.

4. Read cube of item.
   If cube equal zero and weight ½ 0, continue.
   If cube ½ zero, go to 6.
   Otherwise, report error, go to 17.

5. Calculate cube based upon class conversion table and record.

6. Check to see if item is class VII or personnel.
   If yes, set quantity of item to be loaded.
   If no, initialize weight and cube to be loaded.

7. Read load preference table to find preferred type of carrier for this class of item for the specific mode to travel.

If class VII item, see if it will fit through door, if any, and on to carrier, continue. If will not fit call Dump Error routine, go to 17.

Otherwise, continue.

8. If this is not class III bulk, check to see if there is an element of the type needed available - if not add one. Set convoy length and weight if appropriate (rail). Go to 10.

9. If this is not a unit move and it involves rail movement of class V then add appropriate buffer vehicles, if required, set ammo flag, set convoy weight and length and add first element for loading.

10. Call Load Convoy routine.

11. Check quantity yet to be loaded.

If zero, all have been loaded, go to 17.

Otherwise, continue.

12. Could not load everything on identified element of existing convoys, must add a new element or convoy.

13. Read mode.

If mode = 3 (rail), continue.

Otherwise, go to 16.

14. Check to see if adding a new element of the preferred type to the current convoy would exceed authorized length.

If yes, index to a new convoy, go to 8.

If no, continue.

15. Check to see if the weight of the empty element plus a factor of its empty weight exceeds the total authorized convoy weight.

If yes, index to a new convoy, go to 8.

If no, add empty weight to total accumulated weight and vehicle length to total accumulated length. Go to 8.

16. Identify next element to be examined for loading.
If cube and weight permit, identify element for possible load, go to 10.

Otherwise, go to 8.

17. Last item?
If yes, continue.
If no, go to 3.

18. Last REQ1 card?
If yes, return to calling routine
If no, continue.

19. Read next movement (REQ1) entry.

20. Determine whether date, origin, destination, mode and type-move combination is same as last REQ1 entry.
If yes, go to 2.
If no go to 1.

4-4.2 Load Convoy (LDCONV) Routine.

The Load Convoy routine is used to recognize the class of an item to be loaded on an identified element and to call the appropriate loading routine.

FI: PARAM.PRM, WMRFIL.PRM
MN: LODPOL, LOADB, LOAD7, LOADA, LOADP

1. Read class.

2. If class = 32-35 (bulk POL), call Load POL routine. Upon return, return to calling routine.

3. If class = other bulk items (classes I, II, III (package), IV, VI, VIII, IX), or class V with unit moves, call Load Bulk Routine.

4. If class = VII (unique items), call Load Class Seven routine. Upon return, return to calling routine.

5. If class = V (ammo) and this is not a unit move, call Load Ammo routine. Upon return, return to calling routine.

6. If class - 10, 12 or 13 (personnel) call Load Personnel routine. Upon return, return to calling routine.

7. If any other classes report error, return to call routine.

4-4.3 Load POL (LODPOL) Routine.

The Load POL routine loads bulk POL on appropriate carriers. The carriers are filled to capacity, but partial loads are loaded. There is no mixing of products.

FI: POLFIG.PRM, PARAM.PRM, LODING.PRM, NMAXEL.PRM, VEHFIL.PRM, WMRFIL.PRM

SAI: Convoy number of first appropriate convoy.

1. Read in number gallons to be shipped and capacity of carrier. Calculate number of loads. If there is a remainder, the convoy report reflects a warning.

2. If mode = 3 (rail) the weight of the product must be determined in order to add it to the train weight. Product weights are input as variables. Otherwise to go 10.

3. Identify appropriate convoys by date, orgin, destination, mode.

4. Do 5 for each convoy with these attributes.

5. Is convoy complete?
   If yes, bypass, go to 13.
   Otherwise, continue.

6. Is convoy an ammunition convoy?
If yes, bypass, go to 13.
Otherwise, continue.

7. Check to see if adding another element of the preferred type will cause convoy to exceed its authorized length.
If yes, bypass, go to 13.
If no, continue.

8. Check to see if adding another element of the preferred type loaded with the indicated product will cause the convoy to exceed its authorized weight.
If yes, bypass, go to 13.
If no, continue.

9. Increment the total length and weight of the convoy by the new element, go to 11.

10. Check to see if total quantity of elements that make up convoy of other modes are $\leq$ authorized quantity after adding this element.
If yes, continue.
If no, go to 13.

11. All the element to the convoy and load it. Reduce quantity of the item to be loaded by the quantity loaded.

12. Check to see if more elements are needed to load item, if yes, continue until complete. If cannot complete, continue.

13. If only one convoy type exists or none can accept load build a new convoy. Go to 4.
If more than one convoy exists, go to 14.

14. If other convoys exist with the same attributes, check to see if elements can be added by looping through other convoys.
If yes, go to 4.
Otherwise, go to 13.

4-4.4 Load Bulk (LOADB) Routine.

The Load Bulk routine loads bulk items of classes I, II, III (package), IV, V (unit move), VI, VIII, and IX onto appropriate transportation carriers.

FI: PARAM.PRM, LODING.PRM, NMAXEL.PRM, VEHFIL.PRM, WRMFIL.PRM
SAI: Convoy identity of convoy to be loaded, carrier preferences.

1. Do 2 for each convoy with matching date, origin, destination and mode.

2. Is convoy complete?
   If yes, go to 14.
   Otherwise, continue.

3. Is convoy an ammunition convoy?
   If yes, go to 14.
   Otherwise, continue.

4. Do 5 for each element of this convoy.

5. Check current element to see if full.
   If full, go to 7.
   Otherwise, continue.

6. Check to see if this element is a preferred carrier type (for bulk more than one type could be acceptable).

7. Last element this convoy?
   If yes, go to 13.
   If no, go to 4.

8. Calculate remaining weight available on this element.

9. Read mode.

If mode = 3 (rail) then convoy is weight constrained. See if all of item weight can be accommodated within total element and total convoy weight constraints. If convoy has arrived at maximum authorized weight close it out.

Otherwise, go to 13.

10. Calculate remaining cube available on element.

11. Check to see how much of item can be loaded in available cube and if necessary modify quantity and weight previously loaded.

12. If all of item loaded, return to calling routine.

13. If all of item has not yet been loaded, check to see if another element exists in this convoy and if the item can be loaded on this element. If this was last possible element, go to 14.

Otherwise, check next element, go to 15.

14. Check next convoy (if one exists).

If none exists, continue.

Otherwise, go to 2.

15. Check to see if already searched all previous convoys.

If yes, continue.

If no, go to 14.

16. Build a new convoy and add appropriate element. Go to 1.

4-4.5 Load Class VII (LOAD7) Routine.

The Load Class VII routine identifies appropriate elements and convoys which have the residual weight and cube to load a unique item. Subroutine GBL3D is called to determine whether or not the item can be loaded and to do the actual loading.

FI: PARAM.PRM, LODING.PRM, NMAXEL.PRM, VEHFIL.PRM, WMRFIL.PRM, CLASS7.PRM

SAI: Convoy to be searched

MN: SETGBL, LOAD (entry points to GBL3D)

1. Do 2 for identified convoy.

2. Is convoy already complete?
   If yes, bypass, go to 12.
   Otherwise, continue.

3. Read mode.
   If mode = 3 (rail) convoy is weight constrained see if one of item can be loaded on residual weight. If yes, continue. If no, go to 12.
   If other mode, continue.

4. check to see if ammo-only convoy.
   If yes, bypass, go to 12.
   If no, continue.

5. Check to see if this element is full.
   If yes, go to 11.
   If no, continue.

6. Check remaining weight and cube on this element.
   If both $\geq$ required weight and cube, continue.
   Otherwise, go to 11.

7. Call SETGBL routine to initialize entry point in routine GBL3D.

8. Call LODING routine (entry point to routine GBL3D) to try to load item.
   If could not load any, go to 11.
   Otherwise, continue.

9. If element was filled by load, close out element.

10. If loaded all or part, adjust element weight, cube and convoy total weight (if rail).

11. If all not loaded check for another element.
If last element, check next convoy. Continue.
If not last element in this convoy, go to 5.

12. Search previous convoy to see if any can accommodate items.
If already searched prior convoys add element or convoy, return to calling routine.
If only one convoy, return and build new convoy for item, return to calling routine.

4-4.6 Load Ammunition (LOADA) Routine.

The Load Ammunition routine loads bulk ammunition (excludes ammunition moving with a unit) on ammunition only convoys by identifying appropriate elements and adds necessary buffers.

FI: PARAM.PRM, LODING.PRM, NMAXEL.PRM, VEHFIL.PRM, WMRFIL.PRM
SAI: Convoy number of convoy to be loaded, carrier preference

1. Do 2 for each convoy identified.

2. Is convoy complete?
If yes, go to 13.
Otherwise, go to 3.

3. Is convoy an ammunition convoy?
If yes, go to 4.
If no, go to 13.

4. Check to see if element full or a buffer.
If yes, go to 7.
Otherwise, continue.

5. Is this a preferred carrier type?
   If yes, go to 6.
   If no, go to 7.

NOTE: Check to see if this element is preferred carrier type (for bulk more than one type could be acceptable.)

6. Check current element to see if full.
   If full, go to 9.
   Otherwise, go to 11.

7. Last element this convoy?
   If yes, go to 13.
   If no, go to 4.

8. Calculate remaining weight available on this element.

9. Read mode.
   If mode = 3 (rail) then convoy is weight constrained see if all of item weight can be accommodated within total element and total convoy weight constraints. If convoy has arrived at maximum authorized weight close it out and
   Go to 12, otherwise
   Go to 7.

10. Calculate remaining cube available on element and
    Go to 6.

11. Check to see how much of item can be loaded in available cube and if necessary modify quantity and weight previously loaded. Go to 6.

12. If all of item loaded, return to calling routine.

13. If all of item has not yet been loaded, check to see if another element exists in this convoy and if the item can be loaded on this element. If this was last possible element, go to 12.
    Otherwise, check next element, go to 13.b.

13.b Check next convoy (if one exists).
If none exists, go to 12.
Otherwise, go to 4.

13.c Check to see if already searched all previous convoys.
If yes, go to 12.
If no, go to 13.d.

13.d No new element this convoy, go to 12. New elements available, go to 1.

4-4.7 Load Personnel (LOADP).

The Load Personnel routine identifies appropriate elements and convoys which have the residual passenger capacity to load personnel, and load these class 10, 12 and 13 requests.

FI: PARAM.PRM, LODING.PRM, NMAXEL.PRM, VEHFIL.PRM, WMRFIL.PRM
SAI: Convoy identity of convoy to be loaded, carrier preference.

1. Do 2 for each convoy with matching date, origin, destination and mode.

2. Is convoy complete?
If yes, go to 14.,
Otherwise, continue.

3. Read mode
If mode = 3 (rail) see if at least one passenger can be accommodated within overall weight constraints of train. If yes, continue, if no, go to 14.
Otherwise, continue.

4. Check to see if ammo convoy.
If yes, go to 14.
Otherwise, continue.

5. Do 6 for each element in this convoy.

6. Check to see if full.
   If full, go to 8.
   Otherwise, continue.

7. Check to see if this is a preferred carrier type.
   If yes, to go 9.
   If no, continue.

8. Last element this convoy?
   If yes, go to 14.
   If no, go to 5.

9. As total passenger capacity is controlled by quantity, determine remaining capacity.

10. Check Mode
   If mode = 3 (rail) check to see if entire number determined above can be accommodated within the train weight limitations.
   If yes, continue.
   If no, modify the number loaded accordingly, continue.
   If mode ≠ 3 continue.

11. Have all been loaded?
   If yes, return to calling routine.
   If no, continue

12. If all of the item has not been loaded, continue checking elements of this convoy.
   If last possible element go to 14.
   Otherwise, continue.

13. Check next element, go to 5.

14. Check through previous similar convoys, go to 1.

4-4.8 Subroutine GBL3D.

Subroutine GBL3D is an adaptation and extension of an MTMC loading program which has been extended to consider three dimensional loading of unique dimensioned items. It attempts to load a specific quantity of items on a specifically identified carrier (element).

FI: PARAM.PRM, CLASS7.PRM, GBLLOC.FOR, GBLGLBP.PRM, GBLBLBU.FOR

1. Define vehicle capacities.

2. Set filled shadow to empty.

3. Define utilization ratios.

4. Set optimization choice.

5. Define door clearances.

6. Assign displacement values.

7. If there is nothing to load, or the item won't fit through door, return. Otherwise, continue.

8. Try all load orientations. Try stack first, then channel and finally front load space.

9. Determine number of items that can be loaded with current orientation.

10. If any items can be loaded assign new load dimensions.

11. If any item can be loaded, assign new shadow and channel dimensions. Calculate residual cube and weight, total loaded and decrement the number on hand.

12. If none can be loaded, reset dimensions and try alternate orientation.

13. Save information for report generation.

14. If the residual space is less than the slack determined by utilization rate, blank fill it.

15. Determine if space is full.
    If yes, return to calling routine.
    Otherwise, update residual, return to calling routine.

4-5 REPORTS.

As a result of this loading program being used for multiple purposes, the report generation process is extensive. The following routines are used in this process.

4-5.1 Report Generator (RPTGEN) Routine.

The Report Generator routine gathers convoy, element and item data for each movement and readies this data to be output on the appropriate report.

1. Do 2 for each movement.

2. Has this movement already been examined?
   If yes, go to 9.
   Otherwise, continue.

3. Do 4 for each element type in movement.

4. Sort by date and mode within date.

5. Count total elements by type for each convoy.

6. Sort items by class.

7. Last type?
   If yes, continue.
   If no, go to 3.

8. Call Sort Items routine to sort of items by class, then match models when printing out to sum together quantities of the same models.

9. Last movement?
   If yes, return to calling routine.
   If no, go to 1.

4-5.2 Sort Items (SRTITX) Routine.

The Sort Items (expanded items, already loaded) routine sorts loaded items by class and by matching model numbers if any duplicates exist in preparation for output on the ANMELDELISTE report form.

FI: PARAM.PRM, LODING.PRM

1. Sort items by class.

2. Collect quantities of duplicate models if any exist.

3. Return to calling routine.

4-5.3 Report ANMELDELISTE (RPTMIL) Routine.

The Report ANMELDELISTE routine prints headings and appropriate tabulated data for the ANMELDELISTE load report form.

4-5.3.1 Provide for:

1. Convoy number

2. Movement date

3. Mode

4. Originator
   Destination
   Remarks

5. Contents

6. Coaches and cars
   Type
   Quantity
   Total

7. Total meters/Total Tonnage

8. Loading station

9. Unloading station

10. Movement indicator

4-5.3.2 Print out

1. Heading

2. Main body of report

4-5.4 Report Convoy Listing (RPTDET) Routine.

The Report Convoy Listing routine prints out the detailed contents of each convoy with pointers back to original REQ1 data. Print out the following information:

1. Convoy number

2. Date

3. Origin

4. Destination

5. Mode

6. For each element
   a. Type element
   b. Item (LIN or class) quantity and wartime movement line number for each item loaded on this element

4-5.5 Write TRANATAK Tape (RPTSHP) Routine.

The Write TRANATAK Tape routine writes a tape which serves as loading input data for the TRANATAK simulation model. In addition, this routine prints out the data contained on the TRANATAK Tape for analyst review.

4-5.6 Ordinal Number (ORDNO) Routine.

The Ordinal Number (ORDNO) Routine matches a given LIN and vehicle with the Load Plan (LD1FIL.DAT) file and reports any ordinal number that exists for that load combination.

FI: LD1FIL.DAT

1. Match LIN.
   If no match return.
   If match, continue.

2. Match vehicle.
   If match, get ordinal number.

3. Return.

4-6 DEBUG AND DUMP ROUTINES.

In order to asset the users of this loading program an extensive system of debugging and dump routines have been developed for this program. These augment the normal Trace system which is limited to specific activities and calculations by providing detailed access to the data collection, manipulation and recording which makes up this program.

4-6.1 Dump Wartime Movement Requests (DMPWMR) Routine.

Dump Wartime Movement Requests (DMPWMR) Routine. The Dump Wartime Movement Requests routine prints out the generated movement request data arrays.

FI: PARAM.PRM, CARDCT.PRM, LODING.PRM, WRMFIL.PRM, LPFIL.PRM

1. Do 2 for each REQ1 card. (I = 1,NMOVRQ)

2. Print out each REQ1 card.

3. Last REQ1 card?
   If yes, continue.
   Otherwise, go to 1.

4. Do 5 for each REQ2 card.

5. Print out each REQ2 card (i = 1, NITEMS).

6. Last REQ2 card?
   If yes, continue.
   If no, go to 4.

7. Do 8 for each entry in expanded wartime movements request data expanded (i = 1, NMVRQX).

8. Print out each REQ2 card.

9. Last entry?
   If yes, continue.
   If no, go to 7.

10. Print out loading variables from WRMFIL.

11. Return to calling routine.

4-6.2 Dump Load (DMPLOD) Routine.

The Dump Load Routine is a debugging trace routine which prints the contents of variables and arrays used during the loading process.

FI: PARAM.PRM, CARDCT.PRM, WMRFIL.PRM, LODING.PRM

Print out selected variables and arrays including:

Preferred carrier types
Movement Request Data (Expanded)
Convoy data
Element data
Item data
Loading Variables

4-6.3 Dump Error (DMPERR) Routine.

The Dump Error routine, based upon an input argument, automatically prints errors related to loading items onto elements and indicates source of error.

4-6.4 Dump Class VII (DMPCL7) Routine.

The Dump Class VII routine is a debugging trace routine which prints the contents of variables and arrays used during the loading of class VII items.

SECTION 5
USER AND PROGRAMMER GUIDE

5-1 GENERAL.

This section provides guidance for both the user and the programmer of the MPM Loading Program.

5-2 TERMINOLOGY.

All files and subroutines used in the Loading Program will be referred to using names listed in Tables 5-1 and 5-2. These are complete listings which briefly define the content or purpose of each entry. Two files should be noted. The first is the TOE organizational equipment list which is called "SRCFIL.DAT" because it is used when an SRC number is listed on an REQ2 Card for a unit move. The second is the standard equipment description list which is called "EQPFIL.DAT" since it contains equipment data including dimensions, weight, cube and models.

MN Modules Needed
FI File Input
FO File Output
SAI Subroutines Argument Input
SAO Subroutine Argument Output
CI Common Input
CO Common Output

5-3 USER GUIDE.

The User Guide contains information necessary for beginning execution of the Loading Program after all file data has been generated and is available for model use.

5-3.1 Linking The Loading Program.

An executable image of the Loading Program is created by linking the model. All of the subroutines listed in Table 5-1 must be linked together in

order to run the Loading Program. Linking the Loading Program is necessary if no previous executable image exists, or if any subroutines have been recompiled to incorporate code or parameter changes. The Loading Program is linked on the VAX 11/780 by the link command file shown in Table 5-4 "LINKLOAD.COM" by typing '@LINKLOAD next to the dollar sign prompt during an interactive terminal session. The executable image will then exist under the first module name following the LINK command, i.e., as LOADM.EXE in the example below, and the Loading Program can then be run by typing "RUN LOADM" next to dollar sign prompt. Note that the hyphens shown below are continuation marks.

TABLE 5-1. Loading Program Subroutines

DMCPL7	-	writes shadow of vehicles for class 70 through 79 loading process
DMPERR	-	writes data and execution errors
DMPLOD	-	writes contents of loading arrays
DMPWMR	-	writes contents of wartime movement request arrays
GBL3D	-	load unique items on identified vehicles (class 70 through 79)
GBLGLBU	-	contains common data for GBL3D
GBLREP	-	reports class 70 through 79 loading process
LDCONV	-	identifies class of item to be loaded and calls appropriate loading routine
LOAD7	-	initializes loading to unique items (class 70 through 79)
LOADA	-	loads non-unit ammunition (class 50)
LOADB	-	loads bulk items on appropriate vehicles (class 10, 20, 30, 40, 50 as unit 60, 80, and 90)
LOADM	-	driver program
LOADP	-	loads personnel on appropriate vehicles (class 100, 120, and 130)
LODDL	-	reads DAMSEL Location LOC1 Cards
LODEQP	-	reads specially formatted equipment characteristic file
LODFIL	-	calls appropriate file reading subroutine
LODLD1	-	reads type loads with ordinal numbers from LOD1 cards
LODLP	-	reads load preference data from LODP cards
LODPOL	-	loads bulk POL onto appropriate vehicles (class 32 through 35)
LODSEQ	-	builds convoys, selects items to load, adds new vehicles
LODSRC	-	reads SRC unit file
LODVEH	-	reads vehicle dimension data from VEH1 cards
LODWMR	-	reads wartime movement request data from REQ1 and REQ2 cards
ORDNO	-	matches LINs and vehicle to find ordinal numbers
PERMRQ	-	breaks out periodic movement requests
PREDIM	-	matches LIN with model number and get item dimensions if necessary
PRESRT	-	provides LIN numbers for an SRC unit move
RPTDET	-	reports detailed contents of each convoy with specific items on each vehicle
RPTGEN	-	gathers convoy, vehicle, and item data necessary for report generation
RPTMIL	-	produces ANMELDELISTE report
RPTSHP	-	produces TRANATAK data file
SRTITM	-	sorts items by dimension for optimized loading (not completed)
SRITIX	-	sorts items on a convoy by ascending class for ANMELDELISTE report
SRTMRQ	-	sorts movements into loading order
USERIN	-	communicates with user on how to run program, traces, and reports

TABLE 5-2. Loading Program Data Files.

DLFIL.DAT	-	DAMSEL Location file, LOC1 cards
EQPFIL.DAT	-	specially formatted equipment characteristic file
LOADM.DAT	-	post execution output of traces, errors, reports
LD1FIL.DAT	-	type loads with associated ordinal numbers, LOD1 cards
LPFIL.DAT	-	load preference file, LODP cards
SHPMT.DAT	-	post execution output of TRANATAK data, SHPMT cards
SRCFIL.DAT	-	SRC unit file
VEHFIL.DAT	-	vehicle dimension file, VEH1 cards
WMRFIL.DAT	-	wartime movement request file, REQ1 and REQ2 cards

TABLE 5-3. Common Files.

These files are used commonly in different subroutines by the FORTRAN-77 INCLUDE statement. Recompilation of the Subroutine which includes them is necessary if any data in these files is changed.

CARDCT.PRM	-	count of input data cards
DLFIL.PRM	-	damsel location data arrays
EQPFIL.PRM	-	equipment characteristic data arrays
GBLGLBP.PRM	-	GBL3D common data
LD1FIL.PRM	-	load plan data arrays for ordinal numbers
LODING.PRM	-	convoy loading process arrays
LPFIL.PRM	-	load preference arrays
PARAM.PRM	-	parameters set by user
VEHFIL.PRM	-	vehicle dimension data arrays
WMRFIL.PRM	-	wartime movement request data arrays

TABLE 5-4. VAX-11/780 Link Command File.

```
$LINK       LOADM,LODFIL,LODSRC,LODEQP,LODLD1,LODWMR,LODDL,LODLP,LODVEH,-
            PRESRT,PREDIM,PERMRQ,SRTMRQ,SRTITM,-
            LODSEQ,LDCONV,DMPLOD,DMPWMR,LOADB,-
            LODPOL,LOAD7,LOADA,LOADP,GBL3D,DMPCL7,GBLREP,-
            SRTITX,RPTGEN,RPTMIL,RPTDET,PRTSHP,USERIN,DMPERR,ORDNO
```

5-3.2 Parameter Values.

Parameters are used to allow ease in changing the variables which affect execution of the Loading Program. Establishing correct parameter value should be done with care, since many parameters values are critical to optimal use of array storage, used during program execution. If a parameter value is to small, it will be identified during a file reading process, which will indicate the parameter value needed to be increased. Compilations will take longer than necessary for smaller array sizes, and execution will be slowed by the use of unnecessarily large storage space required for Loading Program. A listing of all parameters used is shown in Table 5-5 as represented in the file PARAM.PRM.

Array Boundary Parameter Values.

The parameters which establish boundaries for arrays used during the loading process should in most cases be set equal to the number of cards or records read into the file that the array represents. These parameters are extracted from Table 5-5 and listed below.

NMVRQ$	-	number of REQ1 cards in file WMRFIL.DAT
NITEM$	-	number of REQ2 cards in file WMRFIL.DAT
NDMSL$	-	number of LOC1 cards in file DLFIL.DAT
NLOD1$	-	number of LOD1 cards in file LPFIL.DAT
NVEH1$	-	number of VEH1 cards in file VEHFIL.DAT
NEQP$	-	number of LIN in file EQPFIL.DAT
NSRC$	-	number of SRC numbers in file SRCFIL.DAT
NLIN$	-	number of LINs in file SRCFIL.DAT

Changing Parameter Values.

Parameter values can be changes only by editing the file PARAM.PRM shown in Table 5-5. When the desired changes have been incorporated in PARAM.PRM, any routines which have the FORTRAN statement "INCLUDE PARAM.PRM" must be recompiled, and the Loading Program must then be relinked before execution.

TABLE 5-5. Parameters in PARAM.PRM File.

```
C
      IMPLICIT INTEGER*2 (I-N)
C   COMMON/ARACE/KTRACE
C   NMOVT$ :NUMBER OF MOVEMENT/LOAD TYPES
C   UNIT$  :UNIT MOVE/LOAD TYPE
C   OVER$  :OVERSIZE/OUTSIZE MOVE/LOAD TYPE
C   OTHER$ :ALL OTHER MOVE/LOAD TYPES
C
      INTEGER UNIT$,OVER$,OTHER$
      PARAMETER (NMOVT$=3, UNIT$=1, OVER$=2, OTHER$=3)
C
C   NMODE$ :NUMBER OF MODES
C   AIR$   :AIR MODE
C   BARGE$ :BARGE MODE
C   RAIL$  :RAIL MODE
C   MILWH$ :MILITARY WHEELED MODE
C   COVWH$ :CIVILIAN WHEELED MODE
C
      INTEGER AIR$,BARGE$,RAIL$,MILWH$,CIVWH$
      PARAMETER (NMODE$=5, AIR$=1, BARGE$=2, RAIL$=3,
     +                                MILWH$=4, CIVWH$=5)
C
C   NBUF$  :NUMBER OF BUFFERS FOR NON-UNIT AMMO CONVOYS
C   PASWT$ :IN MTONS
      PARAMETER (NBUF$=1, PASWT$0.8)
C
C
C   RRWT$  :MAXIMUM WEIGHT ALLOWED FOR A RAIL CONVOY IN MTONS.
C   RRLG$  :MAXIMUM LENGTH ALLOWED FORA RAIL CONVOY IN METERS.
C   RLAST$ :THE FACTOR MULTIPLIED TIMES AN ADDITIONAL EMPTY CAR
C    TO SEE IF THE CAR CAN BE ADDED WITHIN CONVOY WEIGHT CONSTRAINTS.
      PARAPMETER (RRWT$ = 1500, RRLG$ = 500, RLAST$ = 1.5)
C
C    NPREF$:NUMBER OF PREFERRED CARRIER TYPES ALLOWED PER ITEM
      PARAMETER (NPREF$ = 5)
C
C    NMVRQ$: OR = # REQ1 CARDS READ IN
C    NITEM$:> OR = # OF REQ2 CARDS READ IN
C    NDMSL$:> OR = # OF LOC1 CRDS READ IN
C    NVEH1$:> OR = # OF VEH1 CARDS READ IN
C    NLOD1$:> OR = # OF LOD1 CARDS READ IN FORM LOAD PLAN FILE.
C    NEQP$ : # OF MODEL LINE NUMBERS IN EQUIPMENT CHARACTERISTIC FILE,
C       ONLY LINE NUMBERS WITH INDEXES ARE CONTAINED IN THIS FILE,
C       A LINE NUMBER 'W29716A00' WILL NOT OCCUR IN THIS FILE.
C    NSRC$ : # OF SRC NUMBERS IN UNIT SRC TABLE
C    NLIN$ : # OF MODEL LINE NUMBERS IN UNIT SRC TABLE
C    NAVSH$: AVERAGE # OF SHIPMENTS FOR REQ1 CARDS, USED TO SET
C       ARRAY BOUNDARIES FOR THE EXPNDED REQ1 ARRAYS, ALLOWS ROOM
```

TABLE 5-5. Parameters in PARAM.PRM File. (Cont'd)

```
C        FOR PERIODIC MOVEMENTS.  ROUTINE WILL STOP EXECUTION AND
C        GIVE ERROR MESSAGE IS NAVSH$ IS NOT LARGE ENOUGH TO
C        ACCOMODATE PERIODIC SHIPMENTS IN WARTIME MOVEMENT REQUESTS.
C        NAVSH$*NMVRQ$ SETS THE ARRAY BOUNDARIES FOR THE EXAPNDED
C        MOVEMENT ARRAYS
C
         PARAMETER (NMVRQ$ = 20, NITEM$ = 500,
        +       NDMSL$ = 100, NHVE1$ = 100, NEQP$=200, NLOD1$=50,
        +       NSRC$=50, NLIN$=500, NAVSH$ = 3)
C
C    NCON$ :> OR = NCON, ARRAY LIMITS FOR CONVOY ARRAYS
C    NELE$ :> OR = NELE, ARRAY LIMITS FOR ELEMENT ARRAYS
C   NITMX$ :> OR = NITEMX, ARRALY LIMITS FOR EXPANDED ITEM ARRAYS
      PARAMETER (NCON$=100, NELE$=700, NITMX$=800)
C
C   LPROW$ : # OF ROWS IN LOAD PREFERENCE FILE CALLED LPFIL.
C   LPCOL$ : # OF COLUMNS IN LOAD PREFERENCE FILE 'LPFIL'
         PARAMETER (LPROW$ - 130, LPCOL$ = 99)
C
C CLASS7 - LDEFINE UTILIZATION OF ITEM LOADNG RATIOS,
C FULL UTILIZATION IS 1.0, AN AVERAGE UTILIZATION IS 0.7
C   THRLG$ :USER DEFINED LENGTH UTILIZATION RATIO.
C   THRWD$ :USER DEFINED WIDTH UTILIZATION RATIO.
C   THRST$ :USER DEFINED STACK UTILIZATION RATIO.
C
      PARAMETER (THRG$= 0.7, THRWD$ - 0.7, THRST$ - 0.7)
C
C CLASS 7 LOADING - DEFINE DOOR CLEARANCES, FLUSH FIT OF ITEM IS 0.0 :
C      CLRLG$ : USER DEFINED DOOR LENGTH CLEARANCE MINIMUM.
C      CLRWD$ : USER DEFINED DOOR WIDTH CLEARANCE MINIMUM.
C      CLRST$ : USER DEFINED DOOR STACK CLEARANCE MINIMUM.
C
       PARAMETER (CLRLG$ - 0.0, CLRWD$ - 0.0, CLRST$ = 0.0)
C
C POL FIGURES BELOW REPRESENT WEIGHT OF LOAD (MTONS)
C   POL32$ :   CLASS 32, DIESEL, 1 M3=.840 MTONS
C   POL33$ :   CLASS 33, MO GAS, 1 M3=.744 MTONS
C   POL34$ :   CLASS 34,    JP4, 1 M3=.794 MTONS
C   POL35$ :   CLASS 35, AVN GAS, 1 M3=.721 MTONS
C
      PARAMETER (POL32$ = 50.8,
     +            POL33$ = 45.0,
     +            POL34$ = 48.0,
     +            POL35$ = 43.6)
C
C
C COMMON/OPTPC/ CONTAINS LOADING OPTIMIZIATION WEIGHT AND CUBE
C PERCENTAGES WHICH MUST BE ACHEIVED BEFORE A CONVOY (ROW 1) OR ELEMENT
C (ROW2) CAN BE CLOSED OUT AS FULL.  THESE ARE INITIALIZED BY MODE IN DATA
```

AD-A131 176 LOAD PLAN AUTOMATION IN A DAMMS-ENVIRONMENT (LADEN) IN SUPPORT OF DEPARTM.. (U) JAYCOR SAN DIEGO CA F L SMITH ET AL. 12 FEB 82 DNA-6133F DNA001-80-C-0365 2/2

UNCLASSIFIED F/G 15/7 NL

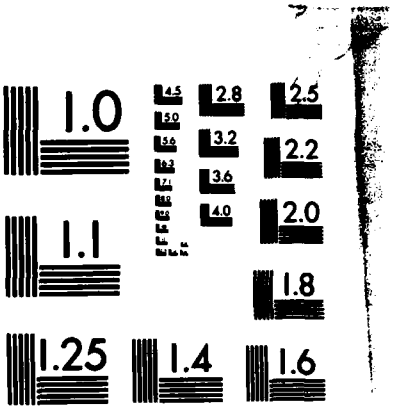


TABLE 5-5. Parameter in PARAM.PRM File (Cont'd)

```
C STATEMENT BELOW.  OPTWT$ CONTAINS PERCENTAGES FOR WEIGHT, AND OPTCU$
C CONTAINS PERCENTAGES FOR CUBE.
C
              COMMON /OPTPC/OPTWT$(2,NMODE$),OPTCU$(2,NMODE$)
              DATA OPTWT$(1,AIR$),  OPTWT$(2,AIR$)  /  .90,  .90  /
              DATA OPTCU$(1,AIR$),  OPTCU$(2,AIR$)  /  .90,  .90  /
              DATA OPTWT$(1,BARGE$),OPTWT$(2,BARGE$)/  .90,  .90  /
              DATA OPTCU$(1,BARGE$),OPTCU$(2,BARGE$)/  .90,  .90  /
              DATA OPTWT$(1,RAIL$), OPTWT$(2,RAIL$) /  .90,  .90  /
              DATA OPTCU$(1,RAIL$), OPTCU$(2,RAIL$) /  .90,  .90  /
              DATA OPTWT$(1,MILWH$),OPTWT$(2,MILWH$)/  .90,  .90  /
              DATA OPTCU$(1,MILWH$),OPTCU$(2,MILWH$)/  .90,  .90  /
              DATA OPTWT$(1,CIVWH$),OPTWT$(2,CIVWH4)/  .90,  .90  /
              DATA OPTCU$(1,CIVWH$),OPTCU$(2,CIVWH$)/  .90,  .90  /
C
C ALERT STAGE PARAMETERS:
C    VSRG       = MOVEMENT DAY
C    (V)SRG     = MOVEMENT DAY + V$
C    (VS)RG     = MOVEMENT DAY + V$ + S$
C    (VSR)G     = MOVEMENT DAY + V$ + S$ + R$
      INTEGER V$, S$, R$, G$
         PARAMETER (V$=3, S$=3, R$=3, G$=11)
C
C   NCLAS$ :   NUMBER OF CLASSES
C   CUBDEF :   CUBE DEFAULT TABLE, HOLDS CONVERSION FACTORS FOR CUBE
C   TO MTONS, ONE FACTOR FOR EACH CLASS, CLASS 1 FIRST.
         PARAMETER (NCLAS$=13)
         COMMON/CUBDEF/CUBDEF(NCLAS$)
         DATA CUBDEF /2.1,2.6,1.7,2.1,.9,2.0,2.0,2.6,2.0,.0,.0,.0,.0/
C
C UNIT NUMBERS OF FILES NEEDED BY THE LOADING PROGRAML
C WMRFIL   :   WARTIME MOVEMENT REQUEST FILE, REQ1 & REQ2 CARDS
C EQPFIL   :   EQUIPMENT CHARACTERISTIC FILE, SPECIAL FORMAT IN ROUTINE
C              LODEQP
C DLFIL    :   DAMSEL LOCATION FILE, LOC1 CARDS
C LD1FIL   :   LOAD PLAN FILE WITH ORDINAL NUMBERS, LOD1 CRADS
C LPFIL    :   LOAD PREFERENCE FILE, LODP CARDS
C VEHFIL   :   VEHICLE DIMENSION FILE, VEH1 CARDS
C SRCFIL   :   SRC FIL, HAS SRC #S AND THEIR LIN #S
C LOADM    :   LOADM.DAT FILE, CONTAIHS ALL OUTPUT FROM LOADING PROGRAM
C              EXECUTION
         COMMON /FILNUM/WRMFIL,EQPFIL,DLFIL,LDQFIL,LPFIL,VEHFIL,
        +SRCFIL,LOADM
         INTEGER*2 WMRFIL,EQPFIL,DLFIL,LD1FIL,LPFIL,VEHFIL,SRCFIL,LOADM
         DATA WMRFIL,EQPFIL,DLFIL,LD1FIL,LPFIL,VEHFIL,SRCFIL,LOADM
        1           /10,11,12,13,14,15,16,17
         CHARACTER CRDFLD*4
C
C NMAXEL   :   MAXIMUM NUMBERS OF ELEMENTS ALLOWED IN A CONVOY BY MODE:
```

TABLE 5-5. Parameters in PARAM.PRM File. (Concluded)

```
      COMMON /NMAXEL/ NMAXEL(NMODE$)
      DATA NMAXEL(AIR$), NMAXEL(BARGE$),NMAXEL(RAIL$),
     +                   NMAXEL(MILWH$),NMAXEL(CIVWH$)
     1 /     1,       60,       0,       60,      60      /
C ONLY THE INTEGER INSIDE THE SLASHES SHOULD BE CHANGED, AND NOT THE
C PARAMETER SUBSCRIPTS.
C
```

5-3.3 FILE USAGE.

The Loading Program assumes that some or all files will be read from the card reader or exist on disk under the names listed in Table 5-2.

Input Files From Card Reader.

COMMON/FILNUM/ contained in file PARAM.PRM is shown below and contains symbolic names for the units each file is read from. An initializing DATA statement assigns values to these symbolic names.

```
COMMON/FILNUM/WMRFIL,EQPFIL,DLFIL,LD1FIL,LPFIL,VEHFIL,SRCFIL,LOADM    INTEGER*
WMRFIL,EQPFIL,DLFIL,LD1FIL,LPFIL,VEHFIL,SRCFIL,LOADM
DATA WMRFIL,EQPFIL,DLFIL,LD1FIL,LPFIL,VEHFIL,SRCFIL,LOADM
                  /10,11,12,13,14,15,16,17/
```

Input files can be read from the card reader if the numbers are changed in the DATA statement to reflect the unit number appropriate to the card reader on the computer system used, and if the card files are entered in the card reader in the sequence expected by the Loading Program. The sequence for reading files is shown in Table 5-6.

TABLE 5-6. File Reading Sequence.

Routine LODFIL expects input files to occur in the following order:

1. SRCFIL.DAT
2. EQPFIL.DAT
3. WMRFIL.DAT
4. DLFIL.DAT
5. LPFIL.DAT
6. VEHFIL.DAT
7. LD1FIL.DAT

If any files are not to be read in from the card reader, unit numbers may be left as shown in the above DATA statement after COMMON/FILNUM/ in file PARAM.PRM. Any files to be read from the card reader must still be input in their respective order with the appropriate end of file control cards placed between the different file decks.

Notes on Data Files.

The files listed in TABLE 5-2 are briefly discussed below.

EQPFIL.DAT

This data file is read by routine LODEQP. The LIN number in EQPFIL.DAT is the first nine character entry on each record. This LIN number may have a non-blank character in the seventh position, but this character is not used by the Loading Program and is converted to a blank for correct matching in routine LODEQP.

LD1FIL.DAT

This data file is created from LOD1 cards and read by routine LODLD1. It is only used to generate ordinal numbers for the ANMELDELISTE report. It is important to note that routine ORDNO uses only the first three characters of the character variable that represents the vehicle model number. LD1FIL.DAT contains three or fewer non-blank characters in the vehicle model field. Representative examples of the vehicle model names in LD1FIL.DAT are KLS, SAS, and RS. Routine ORDNO uses only three characters because VEHFIL.DAT may show a vehicle model of KLS 443, for example, and only the first three are meaningful for determining whether a LIN number item loaded on a vehicle represents an ORDINAL Number. If it is desired to define ordinal numbers using more than three characters in LD1FIL.DAT, so that KLS 443 is a unique ordinal number, the following should be done. The argument called VMODEL that routine ORDNO receives should be changed from CHARACTER*3 to CHARACTER*12. The variable called VMODEL in routine RPTMIL should be changed from a CHARACTER*3 to a CHARACTER*12. This means that all twelve characters of the vehicle model in VEHFIL.DAT must match all twelve characters of the vehicle model in LD1FIL.DAT, or no ordinal number can be obtained by routine ORDNO.

LPFIL.DAT

This file is created from the LODP cards and read by routine LODLP. A LODP card or record must be created for every class that is represented on REQ2 cards, or the Loading Program will halt on a subscript error when a preferred type cannot be found for an item. If an SRC number is submitted in a unit move, the items will be called class 70, and this class must be provided for with a LODP card.

SRCFIL.DAT

Reading of the SRCFIL is optional. This file is used when an SRC number is listed instead of a LIN on an REQ2 card for a unit move. If no SRC numbers are used for unit moves, then this file should not be read because of its large size and the resultant time consuming file reading operation.

VEHFIL.DAT

This file is read by routine LODVEH and is created from VEH1 records. The vehicle types or vehicle sequence numbers represented by the IVTYPE array in file VEHFIL.PRM are read from this file, correspond to the vehicle sequence numbers in LPFIL.DAT, and are represented by the column numbers of the array LODPRF in file LPFIL.PRM. Some important notes about VEHFIL.DAT are included in the discussion of LD1FIL.DAT. It should be noted that maximum load capacity for POL must be gallons in thousands rather than MTONS.

WRMFIL.DAT

This file is read by routine LODWMR and has two record formats: one represented by the REQ1 card format, and another represented by an REQ2 card format. The first record will be in REQ1 format, and the second record will be REQ2 format. The remaining records will be a mixture of REQ1 and REQ2 format, with one and only one REQ1 record followed by one or more REQ2 records. The east REQ2 record following an REQ1 record is recognized by any non-blank character in the last position of this eighty character record. If an REQ2 item has no LIN, this field should be left blank or a LIN of some kind is assumed. It should be noted that POL gallons in thousands should be entered in the item length field of the REQ2 card.

5-4 AN INTRODUCTION TO EXECUTION OF THE LOADING PROGRAM.

The Loading Program may be run both interactively and by batch. Once a new file of wartime movement requests is being loaded smoothly by the program, it will be desirable to run in batch mode. As a new user or when using new files, running the program interactively will be helpful. Running the model interactively is discussed first here, and a guide to running in batch mode follows.

Interactive Execution.

The VAX command 'RUN LOADM' runs the executable image LOADM.EXE of the Loading Program. The user is first given the option to look at current parameter values to check their compatability with the current files being used. If the parameter values are not appropriate, the user may exit the model and change parameter values in the file PARAM.PRM. Changing of parameter values is discussed in 5-3.2.

Parameters.

Parameters appear on the screen as shown below.

```
                        LOADING PROGRAM


DO YOU WANT TO SEE PARAMETER VALUES? (Y/N)  :

THESE ARE THE CURRENT PARAMETER VALUES  :
     NMOVT$ =      3  :  NUMBER OF MOVEMENT/LOAD TYPES
     UNIT$  =      1  :  UNIT MOVE/LOAD TYPE
     OVER$  =      2  :  OVERSIZE/OUTSIZE MOVE/LOAD TYPE
     OTHER  =      3  :  ALL OTHER MOVE/LOAD TYPES

     NMODE$ =      5  :  NUMBER OF MODES
     AIR$   =      1  :  AIR MODE
     BARGE$ =      2  :  BARGE MODE
     RAIL$  =      3  :  RAIL MODE
     MILWH$ =      4  :  MILITARY WHEELED MODE
     CIVWH$ =      5  :  CIVILIAN WHEELED MODE
     NBUF$  =      1  :  BUFFERS, NON-UNIT AMMO CONVOYS
     PASWT$ =    0.8  :  PASSENGER WEIGHT IN MTONS
     NCLASS =     13  :  NUMBER OF CLASSES
```

```
     RRWT$  =    400.0:  MAX WT FOR RAIL CONVOY, MTONS
     RRLG$  =     80.0:  MAX LENGTH RAIL CONVOY, METERS
     RLAST$ =      1.5:  FACTOR TIMES LAST CAR WEIGHT

HIT RETURN FOR MORE PARAMETERS, "E" TO EXIT, "S" TO START EXECUTION:

THESE ARE THE CURRENT PARAMETER VALUES:
   NPREF$  =     5  :  PREFERRED CARRIER TYPES ALLOWED PER ITEM
   NMVRQ$  =    20  :  > OR = # REQ1 CRADS READ IN
   NITEM$  =   500  :  > OR = # OF REQ2 CARDS READ IN
   NAVSH$  =     3  :  AVERAGE # OF SHIPMENTS FOR REQ1 CARDS
   NDMSL$  =   100  :  > OR = # OF LOC1 CARDS READ IN
   NLOD1$  =    50  :  > OR = # OF LOD1 CARDS READ IN
   NCON$   =   100  :  > OR = NCON, ARRAY LIMITS, CONVOY ARRAYS
   NELE$   =   700  :  > OR = NELE, ARRAY LIMITS, ELEMNT ARRAYS
   NITMX$  =   800  :  > OR = NITEMX, EXPANDED ITEM ARRAY LIMITS
   LPROW$  =   130  :  # OF ROWS IN LOAD PREFERENCE FILE
   LPCOL$  =    99  :  # OF COLUMNS IN LOAD PREFERENCE FILE
   THRLG$  =  0.70  :  USER DEFINED LENGTH UTILIZATION RATIO
   THRWD$  =  0.70  :  USER DEFINED WIDTH UTILIZATION RATIO
   THRST$  =  0.70  :  USER DEFINED STACK UTILIZATION RATIO
   CLRLG$  =  0.00  :  USER DEFINED DOOR LENGTH CLEARANCE MIN
   CLRWD$  =  0.00  :  USER DEFINED DOOR WIDTH CLEARANCE MIN
   CLRST$  =  0.00  :  USER DEFINED DOOR STACK CLEARANCE MIN

HIT RETURN FOR MORE PARAMETERS, "E" TO EXIT, "S" TO START EXECUTION:

THESE ARE THE CURRENT PARAMETER VALUES:
   POL32$  =  50.8  :  CLASS 32, DIESEL, 1 M3=.840 MTONS
   POL33$  =  45.0  :  CLASS 33, MO GAS, 1 M3=.744 MTONS
   POL34$  =  48.0  :  CLASS 34,   JP 4, 1 M3=.794 MTONS
   POL35$  =  43.6  :  CLASS 35, AVN GAS, 1 M3=.721 MTONS
   NSRC$   =    50  :  > OR = # SRC NUMBERS IN SRC TABLE
   NLIN$   =   500  :  > OR = # LINE NUMBERS IN SRC TABLE
   NEQP$   =   200  :  > OR = # LINE NUMBERS IN EQUIP TABLE
   NLOD1$  =    50  :  > OR = # LOD1 CARDS

HIT RETURN FOR MORE PARAMETER, "E" TO EXIT, "S" TO START EXECUTION:

LOADING OPTIMIZATION WEIGHT AND CUBE PERCENTAGES,
OPTWT$ = % FOR WEIGHT, OPTCU$ = % FOR CUBE:
                                          CONVOY ELEMENT
                                          (ROW 1) (ROW 2)
OPTWT$(1,AIR$), OPTWT$(2,AIR$)    =        0.90    0.90
OPTCU$(1,AIR$), OPTCU$(2,AIR$)    =        0.90    0.90
OPTWT$(1,BARGE$),OPTWT$(2,BARGE$)=         0.90    0.90
OPTCU$(1,BARGE$),OPTCU$(2,BARGE$)=         0.90    0.90
OPTWT$(1,RAIL$),OPTWT$(2,RAIL$)   =        0.90    0.90
OPTCU$(1,RAILS$),OPTCU$(2,RAIL$)  =        0.90    0.90
OPTWT$(1,MILWH4),OPTWT$(2,MILWH$)=         0.90    0.90
OPTCU$(1,MILWH$),OPTCU$(2,MILWH$)=         0.90    0.90
OPTWT$(1,CIVWH$),OPTWT$(2,CIVWH$)=         0.90    0.90
OPTCU$(1,CIVWH$),OPTCU$(2,CIVWH$)=         0.90    0.90

HIT RETURN FOR MORE PARAMETERS, "E" TO EXIT, "S" TO START EXECUTION:
```

```
ALERT STAGE PARAMETERS:
   VSRG    =  MOVEMENT DAY
   (V)SRG  =  MOVEMENT DAY + V$
   (VS)RG  =  MOVEMENT DAY + V$ + S$
   (VSR)G  =  MOVEMENT DAY + V$ + S$ + R$
           V$ = 3
           S$ = 3
           R$ = 3
           G$ =11

HIT RETURN FOR MORE PARAMETERS, "E" TO EXIT, "S" TO START EXECUTION:

THESE ARE THE CURRENT PARAMETER VALUES,
 CUBE DEFAULT TABLE, HOLDS CONVERSION FACTORS FOR CUBE
 TO MTONS, ONE FACTOR FOR EACH CLASS, CLASS 1 FIRST
   CLASS  1 CUBDEF ( 1)   =  2.10
   CLASS  2 CUBDEF ( 2)   =  2.60
   CLASS  3 CUBDEF ( 3)   =  1.70
   CLASS  4 CUBDEF ( 4)   =  2.10
   CLASS  5 CUBDEF ( 5)   =  0.90
   CLASS  6 CUBDEF ( 6)   =  2.00
   CLASS  7 CUBDEF ( 7)   =  2.00
   CLASS  8 CUBDEF ( 8)   =  2.60
   CLASS  9 CUBDEF ( 9)   =  2.00
   CLASS 10 CUBDEF (10)   =  0.00
   CLASS 11 CUBDEF (11)   =  0.00
   CLASS 12 CUBDEF (12)   =  0.00
   CLASS 13 CUBDEF (13)   =  0.00

HIT RETURN FOR MORE PARAMETERS, "E" TO EXIT, "S" TO START EXECUTION:

UNIT NUMBERS OF FILES:
   WMRFIL  (WMRFIL.DAT)  =  10
   EQPFIL  (EQPFIL.DAT)  =  11
   DLFIL   (DLFIL.DAT)   =  12
   LD1FIL  (LD1FIL.DAT)  =  13
   LPFIL   (LPFIL.DAT)   =  14
   VEHFIL  (VEHFIL.DAT)  =  15
   SRCFIL  (SRCFIL.DAT)  =  16
   LOADM   (LOADM.DAT)   =  17

MAX ELEMENTS/CONVOY BY MODE:
   NMAXEL(AIR$)          =  1
   NMAXEL(BARGE$)        = 60
   NMAXEL(RAIL$)         =  0
   NMAXEL(MILWH$)        = 60
   NMAXEL(CIVWH$)        = 60

** NO MORE PARAMETERS ** HIT RETURN FOR EXECUTION, "E" TO EXIT
```

SRC Unit File.

The next option concerns reading file SRCFIL.DAT. If an SRC number has been included on an REQ2 card for a unit move, then file SRCFIL.DAT should be read. This is a very large file, and therefore should only be read if needed. Answering "yes" sets the variable ISRCRD in COMMON/RDSRC/ equal to one which causes routine LODFIL to call routine LODSRC for reading in file SRCFIL.DAT. This option is shown below as it appears on the terminal screen.

```
DO YOU WANT TO READ THE SRC UNIT FILE?  (Y/N)
      ENTER ANSWER:
```

Final Report Generation.

Three different final reports are generated by the Loading Program. The first is the ANMELDELISTE report, and a representative sample can be seen in Figure 3-1. The second report is the Detailed Load Plan which lists each convoy and its elements and the items that are loaded on each element. The third report is the TRANATAK report which list the MAWLOGS SHPMT card data. A fourth option can be selected to produce all three reports, and a fifth option produces no final reports. The choices appear on the terminal screen as shown below.

```
WHICH REPORT FORMS DO YOU WANT:
   1.  ANMELDELISTE
   2.  DETAILED LOAD PLAN
   3.  TRANATAK REPORT AND SHPMT CARD DATA
   4.  ALL THREE ABOVE
   5.  NONE
ENTER NUMBER:
```

TRACE Statements.

Many subroutines contain WRITE statements which will print contents of variables to the file LOADM.DAT. The detailed aspects of these WRITE statements vary, and the value of the variable KTRACE i.. COMMON/TRACE/ is keyed to this detail. The value of KTRACE is set in routine USERIN when the user selects the trace option from the below menu:

```
DO YOU WANT A TRACE OF THE LOADING PROCESS?
   1.  ERROR REPORT
   2.  ERROR REPORT, SUMMARY LOAD ARRAYS
   3.  ERROR REPORT, SUMMARY LOAD ARRAYS, DETAILED LOAD TRACE
   4.  ERROR REPORT, DETAILED LOAD ARRAYS, DETAILED LOAD TRACE
   5.  FINAL REPORT GENERATION TRACE
   6.  EXIT
ENTER NUMBER:
```

Option one sets KTRACE equal to 1, and errors such as parameter values being too small and file handling problems are reported. This option must be selected to execute the model and does not significantly increase the size of the output file LOADM.DAT. If the Loading Program stops executing before loading is completed, these messages will give a high level recovery message.

Option two sets KTRACE equal to 2 and produces the final loading array values representing the REQ1 data arrays, REQ2 data arrays, expanded REQ1 arrays, convoy arrays, element arrays and expanded item arrays. These arrays are further explained in Appendix A. This option allows checking of how the final loading looks in the actual arrays and does not significantly increase the size of the output file LOADM.DAT.

Option three sets KTRACE equal to 3 and prints the same final loading array values as option two along with very detailed traces of how each wartime movement request is loaded by the loading routines LODSEQ, LOAD7, GBL3D, LOADP, LOADA, LOADB, and LODPOL. This option significantly increases the size of the output file LOADM.DAT.

Option four sets KTRACE equal to 4 and prints the same output as option three along with the intermediate loading array values. This option increases the size of the output file LOADM.DAT the most significantly, and should only be chosen for very detailed debugging of the loading process. In most debugging problems, option three will be sufficient to solve the problem.

Option five sets KTRACE equal to 5 and prints a trace of report generation only. This provides information necessary to debug any problems evident in the loading reports. It is a separate option because it is generally not desired unless final report bugs are the only errors that occur.

Option six exits the use from the Loading Program. This option is an escape from execution which may be desired after reviewing parameters, and no writing will be done to the file LOADM.DAT.

APPENDIX

REQ1 DATA ARRAYS

THIS MOVEMENT REQUEST DATA REMAINS SAME AS IS SEQUENTIALLY READ IN BY ROUTINE LODWMR.

DATA DEFINITION	COLUMN 1 → NMOVRQ	ARRAY THAT DATA IS READ INTO
ITEM PTR	POINTS TO FIRST REQ2 CARD IN REQ2 DATA ARRAYS FOR THIS REQ1 CARD	IPTRI
MOVE DAY	FIRST MOVEMENT DAY (REQ1 CARD)	MOVDAY
MODE	MODE OF MOVEMENT	MODE
MOVE FRQ	MOVEMENT FREQUENCY (REQ1)	MOVFRQ
MOVE COUNT	TOTAL COUNT OF SHIPMENTS TO BE MADE (REQ1)	MOVCT
SHIPPER	DAMSEL LOCATION NUMBER, CONVERTED FROM ALPHA SHIPPER (REQ1 CARD).	ISHDMS
RECEIVER	DAMSEL LOCATION NUMBER, CONVERTED FROM ALPHA RECEIVER (REQ1 CARD)	IRCDMS
LINE NUMBER	LINE NUMBER OF MOVEMENT REQUEST (REQ1)	LINNM
MOVE TYPE	MOVEMENT/LOAD TYPE (REQ2 CARD)	MOVTYP

NMOVRQ – COUNT OF REQ1 CARDS READ IN BY LODWMR ROUTINE.

NMOVRS – USER DEFINED PARAMETER=NMOVRQ, EQUAL TO ARRAY STORAGE SET ASIDE FOR REQ1 DATA ARRAYS.

REQ2 DATA ARRAYS

THIS ITEM MOVEMENT REQUEST DATA REMAINS SAME AS SEQUENTIALLY READ IN BY ROUTINE LODWMR.

DATA DEFINITION	COLUMN 1 → ITEM → NITEMS	ARRAY THAT DATA IS READ INTO
CLASS	REQ2 CARDS	ICLASS
LINN		LINN
MODEL		MODEL
QUANTITY		ITEMQT
WEIGHT		WTITEM
CUBE		CUITEM
LENGTH		LGITEM
WIDTH		WDITEM
HEIGHT		HTITEM
STACKABLE		ISTKBL
LOAD PTR	TEMPORARY POINTERS WHICH ESTABLISH LOAD PRIORITY BASED ON USER DEFINED ATTRIBUTE	IPTRLD

ITEM – CURRENT REQ2 ITEM COLUMN BEING LOADED.

NITEM – COUNT OF REQ2 CARDS READ IN BY LODWMR ROUTINE.

NITEMS – USER DEFINED PARAMETER=NITEMS, EQUAL TO ARRAY STORAGE SET ASIDE FOR REQ2 DATA ARRAYS.

EXPANDED REQ1 ARRAYS

THESE MOVEMENT REQUEST ARRAYS CONTAIN THE ADDITIONAL MOVEMENT DAYS APPROPRIATE TO PERIODIC MOVEMENTS AND ARE SORTED BY ROUTINE SRTMRQ FOR LOADING PRIORITY

DATA DEFINITION	COLUMN (1 ——— IMOV ——— NMVRQX)	ARRAY CONTAINING DATA
CONVOY PTR	POINTS TO FIRST CONVOY IN CONVOY ARRAYS, <0 IF CONVOY IS COMPLETE, 0 VALID	IPTRC
MOV REQ PTR	POINTS TO COLUMN OF REQ1 DATA ARRAYS CONTAINING THIS MOVEMENT'S ATTRIBUTES	MR1PTR
MOVE DAY	ACTUAL DAY OF THIS MOVEMENT	MQR DAY

IMOV = CURRENT MOVEMENT BEING LOADED OUT

NMVRQX = COUNT OF ALL MOVEMENTS TO BE LOADED OUT

NMVRQS = USER DEFINED PARAMETER≥NMVRQX, EQUAL TO ARRAY STORAGE SET ASIDE FOR EXPANDED REQ1 DATA ARRAYS

CONVOY ARRAYS

THESE CONVOY ARRAYS CONTAIN DATA APPROPRIATE TO EACH CONVOY BUILT

DATA DEFINITION	COLUMN (1 ——— ICON ——— NCON)	ARRAY CONTAINING DATA
ELEMENT PTR	POINTS TO FIRST ELEMENT IN THIS CONVOY, <0 IF CONVOY COMPLETE	IPTRCE
CONVOY WEIGHT	SUMS GROSS WEIGHT OF CONVOY	TOTWTC
CONVOY LENGTH	SUMS LENGTH OF CONVOY, RAIL ONLY	TOTLGC

ICON = CURRENT/LATEST CONVOY BEING BUILT

NCON = TOTALS NUMBER OF CONVOYS AS BUILT

NCONS = USER DEFINED PARAMETER≥NCON, EQUAL TO ARRAY STORAGE SET ASIDE FOR CONVOY ARRAYS

ELEMENT ARRAYS

THESE ELEMENT ARRAYS CONTAIN DATA APPROPRIATE TO EACH ELEMENT OF EACH CONVOY AS ELEMENTS ARE LOADED UP.

DATA DEFINITION	COLUMN (1 ——— IELE ——— NELE)	ARRAY CONTAINING DATA
FIRST ITEM PTR	POINTS TO FIRST ITEM ON THIS ELEMENT IN EXPANDED ITEM ARRAYS, <0 IF ELEMENT IS FULL, 9999 IF AMMO	IPT1EI
LAST ITEM PTR	POINTS TO LAST ITEM ON THIS ELEMENT -9999 IF AMMO	IPT2EI
CLASS 7 PTR	POINTS TO CLASS 7. LOAD DATA	IPT7EI
ELEMENT PTR	POINTS TO NEXT ELEMENT THIS CONVOY, -1 IS LAST ELEMENT THIS CONVOY	IPTREE
ELEMENT TYPE	ELEMENT TYPE	ITYPEL
ELEMENT WEIGHT	SUMS NET WEIGHT OF ITEMS LOADED ON ELEMENT	TOTWTE
ELEMENT CUBE	SUMS CUBE OF ITEMS LOADED ON	TOTCUE

IELE = CURRENT/LATEST ELEMENT BEING LOADED

NELE = TOTALS NUMBER OF ELEMENTS ON CURRENT/LATEST CONVOY

NELES = USER DEFINED PARAMETER EQUAL TO ARRAY STORAGE SET ASIDE FOR ELEMENT ARRAYS

EXPANDED ITEM ARRAYS

THESE ITEM ARRAYS CONTAIN DATA APPOPRIATE TO ITEMS AS LOADED ON TO ELEMENTS

DATA DEFINITION	COLUMN (1 ——— ITEMX ——— NITEMX)	ARRAY CONTAINING DATA
NEXT ITEM PTR	POINTS TO NEXT ITEM THIS ELEMENT	IPTRII
REQ2 PTR	POINTS TO COLUMN OF REQ2 DATA ARRAYS CONTAINING THIS ITEM'S ATTRIBUTES	MR2PTR
ITEM QUANTITY /WEIGHT	QUANTITY LOADED IF CLASS 7 OR PAX WEIGHT LOADED IF NOT CLASS 7 OR PAX	IXPQT/XPWT
ITEM CUBE	CUBE ITEM LOADED IF NOT CLASS 7	XPCU

ITEMX = CURRENT/LATEST COLUMN OF ITEM TO BE LOADED

NITEMX = COUNT OF TOTAL ITEMS LOADED

NITMXS = USER DEFINED PARAMETER=NITEMX, EQUAL TO ARRAY STORAGE SET ASIDE FOR EXPANDED ITEM ARRAYS

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